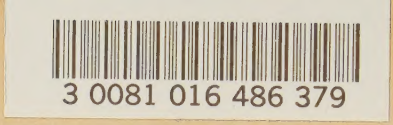
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MENTAL GROWTH AND DECLINE

By HARRY L. HOLLINGWORTH

VOCATIONAL PSYCHOLOGY AND CHARACTER ANALYSIS

PSYCHOLOGY: ITS FACTS AND PRINCIPLES

MENTAL GROWTH AND DECLINE

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JUDGING HUMAN CHARACTER

THE PSYCHOLOGY OF FUNCTIONAL NEUROSES

ADVERTISING AND SELLING
Principles of Appeal and Response

MENTAL GROWTH AND DECLINE

A SURVEY OF DEVELOPMENTAL PSYCHOLOGY

BY

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D. APPLETON AND COMPANY

NEW YORK LONDON

1930

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PREFACE

The author of this volume has for many successive years conducted a course in developmental psychology for college students and prospective teachers and parents. With the remarkable progress in psychology during those years, two things have happened. The older volumes on genetic psychology have become inadequate, and some of them misleading. The more recent volumes have been devoted to rather narrow sections of human growth, such as "preschool age", "adolescence", and "senescence".

For the use of specialists, and for students whose general genetic background is already acquired, these intensive treatises are excellent. But the college student, the general reader, and the prospective teacher who has not yet decided between kindergarten, high school, or clinical work, requires first a more general survey. Such a survey must usually, in our crowded schedules, be confined to a half-year course.

Many students come to psychology with no coherent preparation in general biology. Hence it often seems wise to begin developmental psychology with certain topics and collateral reading in the fields of evolution, genetics, and embryology. There is consequent difficulty in combining this preliminary reading with the mastery of half a dozen books on different periods or aspects of mental growth.

The present volume originated as a series of college lectures which attempted a survey of our knowledge of individual mental development. The child-study books have a predominant pedagogical point of view, and they give little or no material on the very early developmental stages, nor

on those subsequent to adolescence. But the general student is interested in the whole career of human life, not merely in its infancy and school days. The origins and destiny of mental activities are fully as inviting topics as are the periods of their school exercise.

It has therefore seemed desirable on the one hand to trespass, lightly, on the non-psychological territory of heredity, variation, and embryology. It has been necessary, on the other hand, to trace development not only through maturity and senescence to the close of individual life, but also to outline some of the persisting influences of individuality in the sociological territory of institutions.

The author of such a survey is under heavy obligations to many whom he forgets. Into his notes as the years pass there creep memoranda and addenda the source of which cannot later be traced. Effort has been made, through the mention of names or the citation of references, to indicate the constant indebtedness to those whose diligence has accumulated our rapidly increasing knowledge of mental development. That the original reporters cannot sometimes be identified may be construed as a complimentary revelation of the firm place their observations have found in our faith and understanding.

H. L. H.

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MENTAL GROWTH AND DECLINE

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CHAPTER I

INTRODUCTION

THE PROBLEM OF DEVELOPMENT

In any field of human inquiry, the most intriguing problems and phenomena are likely to be those of development. How things become what they are, and how one thing becomes another, how a later stage grows out of an earlier one, these indeed are some of the fundamental scientific questions. "The development of a human being, of a personality, from a germ cell," writes Conklin,[1] "is the climax of all wonders, greater even than that involved in the evolution of a species or in the making of a world."

This developmental or genetic interest has always been present in psychology.[2] But the difficulties encountered in the study of mental development are so numerous that the embryology of the mind has failed to keep pace with that of bodily structure. Later changes in the growth of personality are also so complex and variable that, in the account of them, speculation has always tended to run far

[1] Conklin, *Heredity and Environment*, second edition, 1917.

[2] See, for example, Sanford's paper on "Mental Growth and Decay" published twenty-five years ago in the *American Journal of Psychology*, XIII (1902), pp. 426-449.

in advance of observation. The attempt to avoid such errors sometimes leads to a neglect of the genetic interest, and this has happened in psychology.

In the more familiar books and courses on psychological themes we are occupied with aspects of the adult human mind, or at most, with partial features and with special topics. It is well also from time to time to survey the individual as a whole, in his growth and longitudinal changes. The attempt to give such a survey constitutes developmental psychology.

We mean by "development" all those changes which occur to constitute the life history of the individual. The infant does not merely start out from birth to become a school child, or to attain voting age; his aim is far more complex than that. He sets out, from the moment of conception, rather than from the moment of birth, and his goal is the production of an old man or woman; indeed, the ultimate goal of development is death.

Thus growth and decay are both developmental phenomena. The prenatal influences which prepare the way for an individual, and the enduring influences which he leaves behind him after his departure from life, should also be included in a study of his development. Perhaps the most important question in the science of psychology, as well as in our general understanding of human affairs is "How do people come to be what they are?" This, in the main, is the problem of developmental psychology.

We must hasten to admit that our ignorance is great concerning the laws of development. We may raise many questions and point to many phenomena which must for the present remain more or less mysterious. But even here it is useful to indicate the phenomena, to become familiar

with facts and tendencies, even if we are yet unable to portray the causal relationships. Only by noting such phenomena and by trying to relate them to other facts does their problematic character become obvious. We shall find many things yet unexplained concerning the development of human personality; but we may also hope to dispel numerous superstitions that have long stood in the way of a better comprehension.

MOTIVES FOR THE STUDY OF DEVELOPMENTAL PSYCHOLOGY

Numerous gains should accrue to the student of developmental psychology. At least the following advantages may be indicated, by way of specifying the nature of those gains.

(*a*) Developmental psychology should reveal general laws or tendencies of growth, which perhaps apply not only to individual development but also to the development of other structures and organisms, and even to social institutions and political movements, in short to all phenomena which come gradually to their full stature.

(*b*) Such a study should enable one to understand more clearly one's own mental characteristics and personality, to see more definitely the sources and tendencies of individual make-up, and thus afford a better technique for the modification of personality to better conformity with one's ideals or with the requirements of life.

(*c*) Developmental psychology should afford to every one a better understanding of other people: to parents, a better understanding of their children; to children, a better understanding of their parents, their grandparents, and other family associates; to teachers, leaders, social

workers, and all who deal with human beings, it should afford a better adjustment to the peculiarities of other individuals.

(*d*) To the special student of psychology the study of development should give a better picture of the normal human mind, and useful indications relating to the more general problems of adult psychology. Especially it should afford a normal picture or standard on the basis of which subsequent studies of abnormal mental conditions may be better interpreted and understood.

VARIOUS METHODS OF APPROACH

The approaches to developmental psychology are numerous. The plan and scope adopted in this volume have emerged, from many trials with college classes, as the most feasible for the present purpose. In surveying the psychology of development with these classes many other methods have been experimented with. Some of these are useful, and have their own advantages. They may be combined, with great instructiveness, with such an approach as that here used, and it seems therefore worth while describing briefly some of the plans we have tried out in finally arriving at the method of the present survey.

We found it extremely interesting to approach the problems of development through the reading of several books dealing with evolution, embryology, and social change. Such volumes, since they portray the development of man as a species, of the individual organism, and of social institutions and customs, afford a suggestive introduction to the genetic point of view. But their discussion and subject matter proceed usually at a tangent to

individual mental growth, which is the chief concern of psychology. We have used with profit, by this indirect method, such volumes as *The Evolution of Man,* by Lull, Ferris, Parker, Angell, Keller, and Conklin; the volume entitled *Heredity and Environment,* by Conklin; and Müller-Lyer's *History of Social Development.*

A second method employed was that of the intensive study of the biography of particular individuals, in the effort to discern the developmental factors influential in their lives. We studied in this way several people of distinction and achievement as well as special cases of delinquency and failure; sometimes also careful study was made of the previous life history of the individual members of the class, using as a guide such outlines as that of Yerkes and LaRue.[3] The difficulties of this method were varied, although the interest aroused by it was keen and the results seemed profitable and suggestive. Aside from the difficulty of securing reliable and sufficiently minute biographical data, need was felt for a preliminary account which might serve as a general guide in the study of such influences as might be suspected or observed.

This led to the third method, which was essentially that of becoming acquainted with many of the volumes on child study, genetic psychology, and the accounts of special developmental periods, such as infancy, adolescence, senility, and the like. These volumes were so heterogeneous in method that it was difficult to piece them together into such a picture of the whole individual as we sought. And there was also an almost exclusively educational emphasis in them, occasioned by their having been written chiefly

[3] *Outline of a Study of the Self,* Harvard University Press, 1913.

from the point of view of teaching and school management. This pedagogical stress seemed to give only an imperfect picture of human development, much of which is extra-academic, and much of which occurs either before or after the period of formal school attendance. It is nevertheless true that most of our information concerning developmental principles is to be found in these volumes, along with those on evolution, embryology, and social change.

A fourth method was also tried. Through the intensive study of the rise of such human institutions as speech, the family, money, clothing, and the like, we sought for suggestions of general developmental laws, which might reflect the development of the human mind. But the origin of these institutions is lost in prehistoric days, and their history is complicated by numerous influences not directly related to the intrinsic character of mental growth; therefore this approach was not as fruitful as its general description might suggest.

METHOD OF THE PRESENT VOLUME

The method finally adopted is in some sense a synthesis of all these. It consists in seeking for a coherent picture of the typical course of individual development, as conditioned by the general facts of evolution and embryology, modified throughout by the determination of education and training, and under the constant influence of social heritage and established institutions. In this way laws of development, in whatever field observed, may be brought together in their application to the growing person, who is after all the chief object of interest of developmental

psychology. There is reason to hope that this synthetic approach will have a general usefulness, inasmuch as development, wherever found, may be supposed to have some general aspects. These general aspects are what lead Conklin [4] to assert that "whether it be the development of an animal from an egg, of a race or species from a pre-existing one, or of the body, mind and institutions of man, this problem is everywhere much the same in fundamental principles, and knowledge gained in one of these fields must be of value in each of the others."

[4] Conklin, *op. cit.* p. 6.

CHAPTER II

THE NATURE OF DEVELOPMENT

Development, as we shall use the word, signifies progressive change, without reference to the direction in which this change occurs. There is a common usage of the word "development" which contrasts it with "decay." A goal is here assumed, which has some desirable status, and progress toward this goal is considered to be development, whereas movement away from the goal is indicated by other words.

But even when this special use of the term is made, the more general significance of "development" is likely also to be recognized, as in such phrases as the "development of decay," the "development of old age," the "development of dementia." We may therefore waive the more eulogistic or complimentary use of the word, and employ it to indicate any progressive series of changes, especially those in which some principle of orderliness or coherence may be discerned. This qualification of orderliness implies merely that customary or typical relations may be found between one stage and those preceding or following it; but the orderliness may in some cases be sufficiently impressive to permit of the formulation of a developmental law.

CHANGES IN MAGNITUDE

A pile of sand, a body of water, a snowball, may develop or grow by mere accretion or increase of substance.

This is also one of the ways in which human beings develop. Physically this mode of development is obvious. With increasing age, up to a certain point, one becomes *larger* in various ways, heavier in weight, taller in height, larger in circumference. This is true not only of the individual as a whole, but in general also of each organ of the body. Corresponding to size in structure are strength in function and range or richness in capacity. Not only do one's motor power, accuracy, and speed increase with growth; the powers of perception, invention, and reflection also expand. Thus the infant initially limited to a cry of pain and a gurgle of pleasure acquires a larger vocabulary, a greater store of memories, a richer fund of ideas, and a wider range of mental skills and dexterities. His sphere of influence, once narrow and trivial, may so increase as to involve international complications.

But increase in magnitude is far from representing the fullness of development. Every one knows that the oak does not develop through the mere increase in size of an acorn, although in the field of mental development the facts are not always so obvious. Physically, at least, it is apparent that the child is not an adult in miniature; men are much more than "children of a larger growth." An adult at a distance is not readily confused with a child close at hand; photographs of human beings usually reveal whether the subject is young or mature. In fact the magnification of an infant's physique to adult scale results in a grotesque effect that is far from being the typical adult picture. If we could magnify an infant's mind the contrast with the adult would be no less bizarre. Development, it is clear, is not merely increase in size.

Figure 1 illustrates the proportion changes for stature.

CHANGES IN PATTERN AND PROPORTION

Changes in size, if they proceed at *varying rates* in different parts, result in changes in pattern as well. It is especially this change in proportion that distinguishes the adult frame from the magnified infant. Thus the enormous head of the newborn infant has almost attained its maximum size, the height of the head will only double in the period between birth and maturity. But the upper limbs will become some four times their length at birth, and other parts will increase even more markedly.

The following statements, assembled from various studies of the differential rates of growth of different bodily parts, illustrate the great complexity of this harmonious change of proportions:

In the advance from infancy to adult life:

Height of head.....doubles
Length of body.....trebles
Length of upper limbs.....quadruples
Weight of the brain.....quadruples
Length of lower limbs.....quintuples
Weight of heart.....increases thirteenfold
Weight of lungs.....increases twentyfold
Weight proportion of bone, fat, and skin.....does not change
Weight proportion of muscles.....increases twofold
Weight proportion of nervous system....decreases to one-eighth of infantile proportion

The mental features show also this development through change of emphasis and pattern. Interests once dominant fade before new enthusiasms; food, toys, sweethearts, political ambitions, in turn become uppermost in importance. Childish fears diminish as the hopes of adolescence blossom forth; imagery plays a smaller and

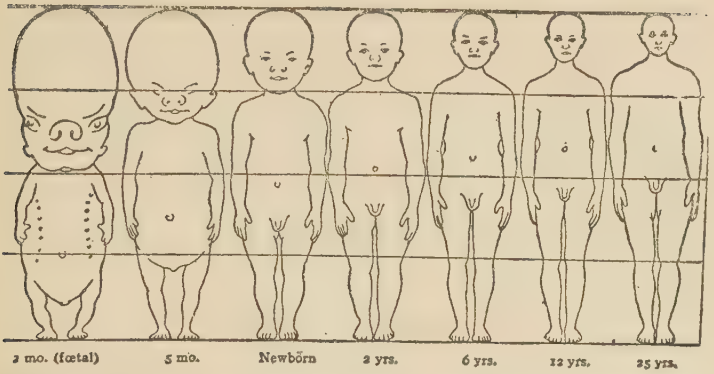

FIG. 1.—ILLUSTRATING THE CHANGES IN PROPORTIONS DURING PRENATAL AND POSTNATAL GROWTH.

In the second month the head height represents one-half of the total "stature"; by birth it is only one-quarter, and by maturity but one-eighth of the total. (After Stratz. Reproduced by permission from Fig. 16, p. 17, of the Seventh edition of Morris, *Human Anatomy*, P. Blakiston's Son and Co., Philadelphia, 1923.)

smaller rôle, while verbal types of thinking become more prominent.

DISAPPEARANCE OR REDUCTION OF FEATURES

The process of development is even more complex than these changes in *magnitude* and in *pattern* suggest. With growth not only are new feature acquired but established features may be reduced or even entirely lost. Thus, among physical characteristics, the thymus gland, a well developed structure in infancy, has usually disappeared by maturity or earlier. The Babinsky reflex, a characteristic infantile reaction, is no longer manifested after the first year or thereabouts, except in grave pathological conditions. The familiar grasping reflex, one of the most definite reactions of the newborn child, usually dis-

appears or is overlaid by the fourth month. The loss of the milk teeth is essential to the proper growth of the later set.

Loss or reduction of mental features is equally essential to development beyond earlier stages. Infantile vocabulary (baby talk) is forgotten by the time Greek and Latin loom in sight. Childish impulses are overlaid by adult inhibitions. In old age even the zests of lust and appetite fade; familiar objects become strange; old memories are lost; and even the senses decline in range and acuity. Thus regions of the tongue and mouth originally sensitive to taste lose their sensitiveness to taste stimuli, and the range of audible sounds diminishes.

Much in fact of civilized mental development consists in either the atrophy or the inhibition of characteristics normal to childhood and to conditions of primitive life. Whether the change be one of actual deterioration, or, instead, of suppression and inhibition, the result is a loss of the characteristic from the final picture. Various vestigial organs in the human frame suggest very definitely the way in which evolution may involve the gradual loss of organs characteristic of earlier forms. The chrysalis must cease to be a worm in order to become a butterfly.

ACQUISITION OF NEW FEATURES

Development through the process of acquiring new structures and traits is as familiar as that by mere increase in magnitude, and is so obvious as scarcely to need emphasis. How the new can come from the old is, however, often a great mystery. The beardless, toothless infant comes in time to require both barber and dentist.

With puberty new topics of curiosity and interest arise. New habits, new skills and dexterities, new information, education seeks to impress. New standards and values are in process of formation until late in life. Age brings new experience, new scenery, new worries. Vocational ambitions, the dread of poverty, insane delusions, responsibilities of parenthood, religious conversion, artistic urges, these do not appear in infancy but come with growth.

DECLINE AND DECAY

Nor is the total complexity yet disclosed. As the Introduction insisted, development does not cease when the individual becomes a voter and property-holder. The ultimate goal of each individual born is the complete route from conception to the end of life. Indeed one author, Minot, who had a special interest in developmental processes, asserts that the whole process of life is one of gradual decline, that "at fertilization a stimulus is supplied to the developing organism which is gradually dissipated during the later growth and differentiation, until finally none is left and the organism dies of old age."

At any rate it is clear that developmental psychology will find much of interest in those changes which constitute decline. For decline is not merely the retrogression of senility. Decline and decay are the rule in mental growth, as the new succeeds upon the old. Powers once come to maturity suffer either gradual or sudden disruption. The play impulse, the missionary fervor, the longing for travel, so common to youth, soon reach their climax and dwindle in coerciveness. Youth's radical temper fades into the caution and complacence of the

adult. The competitive urge is likely to weaken and the violence of emotion to abate itself as maturity follows upon adolescence. Beyond a certain point, which is its climax, passion wanes as age advances. Intellectual acumen, mental control and inhibition, capacity for learning, and even the store of acquired skills and the stock of ready information decline with the growing amnesia and decrepitude of the senile.

Once the original impetus of life is given, the problems of development center chiefly about these varieties of change. How magnitude increases by accretion; how proportions and pattern are influenced and determined; how characters are suppressed, lost, or reduced; how novel traits emerge; and how established features deteriorate, these constitute some of the most fundamental developmental questions.

What it means to be childish is not, then, so simple a matter as might at first appear. Nor are the changes that come with old age, and its form of "childishness" merely the loss of adult traits and a return to infantile characteristics. In recent years much use has been made of the term "infantile" in describing the characteristics of adults. We may suspect even at this early point that the term as employed is not a descriptive but a figurative one; it is a term of reproach, a mode of ridicule, that should not carry undue weight in the enterprise of developmental psychology.

FIELDS OF DEVELOPMENT

In recent years considerable study has been made of the various distinguishable "fields" in which individual human development may proceed at different rates. This

has resulted in the distinction between different kinds of "age" which may be characteristic of the individual, such as chronological age, anthropometric age, anatomical age, physiological age, mental age, social age, educational age. Although balanced development shows a close correlation between all the individual's modes of development, it appears that under the general laws of heredity and diversity a growing individual may be "more advanced" in some of these respects than in others. Sufficient lack of balance in an individual may thus result in faulty adaptation to average demands.

Chronological age is of course the mere calendar period of existence. Anthropometric age represents the individual's development with respect to the measures of dimension of the various structures. Anatomical age indicates the stage of complete development in these structures, and such features as degree of ossification (especially of the bones of hand and wrist) and the appearance of teeth have been used as indices. Physiological age is more commonly measured by the stage of development of the reproductive system and its functions, and the secondary sex characteristics. Mental age is best revealed by measurements of intelligence, educational age by school status and knowledge, social age by degree and mode of adaptation to the social environment, and so on. It is clear that there is no arbitrary limit to these distinctions. Thus we might also have financial age, emotional age, sport age, artistic age. We might scale any human feature along the units of a developmental scale, and study its correlation with other features in developmental status.

The general principle involved in such determination of developmental status in any field of growth may be

illustrated in the case of "anatomical age." As chronological age advances, the anatomical structures and organization mature, up to at least the end of the period of adolescence. Anatomists suggest that skeletal development is the best single index of anatomical maturity, and this varies in different individuals of the same chronological age. The best single index of skeletal development, in turn, is found to be the growth of the wrist bones. These appear as early as the fœtal period, as centers of ossification, which increase in size with age during childhood. Radiographs of the wrist enable measurements to be made of the absolute or relative areas of ossification. Such measures have in recent years been much employed as signs of "anatomical age." [1] Anatomical age, as thus measured, may be compared with physiological age, mental age, educational age, social age, and other lines of development. In general, early maturity in one field goes with advanced development in others. But individuals differ markedly from one another in all these respects, even when their chronological ages are the same.[2] Thus Baldwin writes, "Some boys reach pubescence at 11 years of age, others not until 16 years of age; some girls reach this period of maturity at 10 years of age or earlier, others not until 16 or 17. Boys and girls who mature early in these functions may be considered physically older than those of later maturation."

---

[1] Baldwin, "The Physical Growth of Children from Birth to Maturity," University of Iowa Studies in Child Welfare, I, No. 1 (1921). Chaps. vii and viii may be consulted for an interesting account of the details of such studies of physical age.

[2] On the concept of "mental age" see Terman, *The Measurement of Intelligence*, chap. iii, 1916, and L. S. Hollingworth, *The Psychology of Subnormal Children*, chaps. iii and iv, 1920.

CHAPTER III

GENERAL FEATURES OF HUMAN DEVELOPMENT

Human development, whether physical or mental, shows certain broad characteristics which it will be well to indicate very early in our study. Their significance, and their applicability in the various fields in which growth occurs, will be more fully appreciated later on, but they should be held in mind at the beginning since they afford useful clues, and, indeed, necessary cautions.

1. *Development is both intrinsically and extrinsically determined.* The intrinsic determination is what we ordinarily call heredity; extrinsic factors are commonly grouped under the general term environment. Heredity sets the limits and determines the direction; extrinsic influences furnish the developmental conditions and modify the course. Development is neither the result of a wholly inner compulsion, nor merely the consequence of the play of external forces upon an undifferentiated germ. Within a uniform or common environment peculiarities and individual differences of growth will more clearly reflect the influences of original constitution. But it is also true that violent environmental variations may so distort the course of growth that the hereditary determiners may be scarcely recognizable. In order to grow, the individual requires food. The final product, as well as the development incidents, will vary both with the individual and with the food supply. In the mental field this is equally

true. Angry impulses do not spontaneously arouse themselves; they must be *provoked* by extrinsic episodes or stimuli. No amount of "stimulation" will make a stone develop; but neither will an embryo grow except under some mode of stimulation.

2. *Development is continuous rather than saltatory or spasmodic.* It proceeds by gradual increments rather than by leaps and bounds. This is at least the rule under ordinary or normal conditions. When deviations from this rule are found, it is usually because the continuous tendency of the intrinsic factors has been distorted by the deliberate or violent manipulation or fluctuation of extrinsic features. Height, weight, intelligence, skill, vocabulary, in their growth, do not alternately loaf and spurt. Instead they increase so continuously and gradually that only measurement at fairly widely separated intervals of time reveals their development. Obviously it would be *possible* to interfere with this continuity. Prolonged alternation of periods of starvation and overfeeding might result in a growth curve, in height or weight, containing many plateaus, with subsequent rebounds. Periodically depriving an individual of conversation and reading might produce a similar saltatory growth curve in vocabulary.

The accompanying set of curves shows the typical course of development in stature, in the case of consecutive measurements of the same individuals. At a given age the curves run at characteristically different heights, but singly they do not differ significantly from curves plotted from different groups at varying ages. Trivial irregularities occasionally occur, but the most striking features of the curves are their gradual and continuous rise,

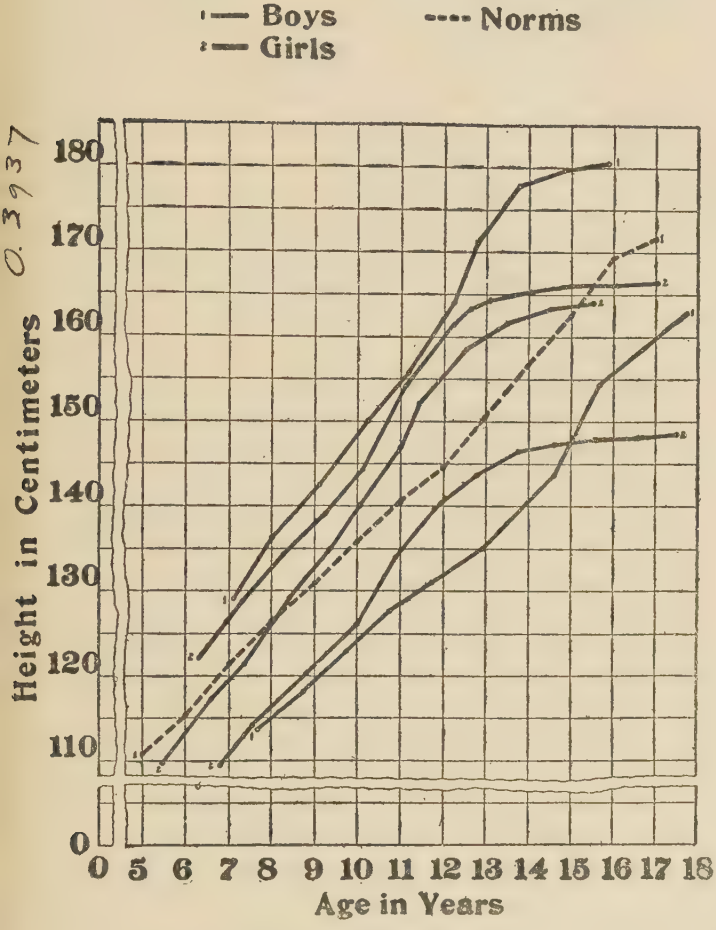

FIG. 2.—CURVES OF GROWTH.

(From Baldwin and Stecher, University of Iowa Studies in Child Welfare, II, No. 1, 1922. Reproduced by permission.)

their remaining on characteristically different levels, and their tendency to flatten out toward the close of the adolescent period. What we know of mental development discloses no departure from this rule.[1]

3. *Various features develop at differential rates, and approximate their maximum at different times.* Presumably, however, these differential rates make for the harmonious and stable development of the individual as a whole. Since it is mental development which will be our chief concern later on, we may conveniently illustrate this principle now by reference to the growth of various physical characteristics.

The accompanying set of curves[2] shows the rate at which several measurable features approach their developmental maximum. This maximum is taken as being the average status of individuals at the age of eighteen years. The *per cent* which the average measure of individuals is at other ages thus shows the degree to which the given features are "mature" at each age. Thus the length of the skull has attained its maximum by the seventeenth year; it is no larger at eighteen years than at this time. The curve shows that by the age of ten years the average skull is 95 per cent as long as it will eventually be.

These curves neatly illustrate both parts of the general principle. At any given age, as at eight years, the various features have attained varying degrees of maturity. At eight years grip, weight, pain limen, height, tapping rate, and skull length have reached, on the average, 22 per cent, 38 per cent, 55 per cent, 70 per cent, 73 per cent, and 92 per cent of their eighteen-year-old status. These various

[1] See, for example, Figures 5, 6, and 10-14.

[2] H. L. Hollingworth and Poffenberger, *Applied Psychology*, p. 123.

features have been developing at differential rates up to this point.

Moreover they continue to develop at differential rates beyond this point, some by a line which is approximately straight, some by a curve that is concave, the rate becoming somewhat more rapid toward the end; others by a

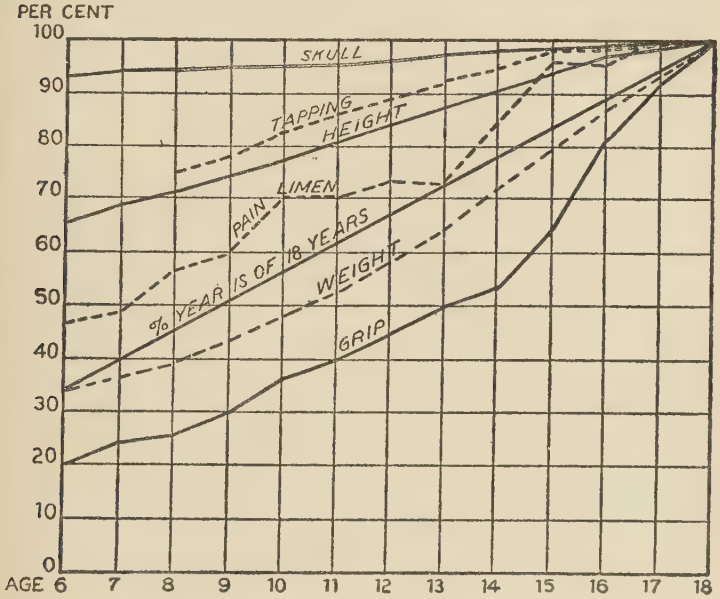

FIG. 3.—DIFFERENTIAL RATES OF DEVELOPMENT.

(From Hollingworth and Poffenberger, *Applied Psychology.*)

convex curve, the rate finally slowing down. And although the last four features named have apparently attained their final status by eighteen years, the first two are still on the increase.

Another interesting way in which to portray the differential rates of growth of various features is by the

growth profile of an individual. In the following set of curves from Baldwin, the growth in different measurements is shown in the case of a girl, from the age of seven

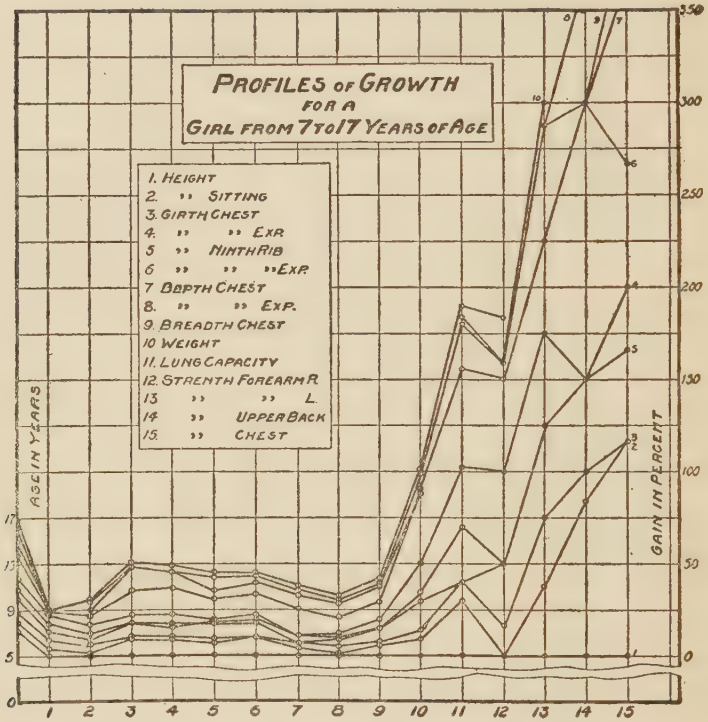

FIG. 4.—GROWTH PROFILES.

(From B. T. Baldwin, "The Physical Growth of Children from Birth to Maturity," University of Iowa Studies in Child Welfare, I, No. 1, p. 114. Reproduced by permission.)

to seventeen years. Each vertical line represents a measurement, as shown in the explanatory table. The lowest curve is the seven-year basis, which is taken as 100 per cent throughout. Each of the succeeding curves, placed

higher and higher on the chart, shows the percentile growth in the various features at the dates or ages represented on the left of the chart. The per cent is always per cent of the initial seven-year magnitude.

Thus in growing from seven to seventeen years, this girl increases only 25 per cent in height; in girth of chest she increases 50 per cent; in weight her increase is 100 per cent; in forearm strength the increase is 300 per cent, and so on.

4. *Development commonly proceeds at the pace at which it starts.* Those who are destined to achieve distinction begin to do so at an early age. Reference to the growth curves for height will illustrate the significance of this principle. Since the final average height of men is different from that of women, we should compare the two boys with one another, in this set of curves, and the three girls. Curves 1 for the two boys begin on different levels. One boy is the taller at seven years, and he remains taller than the other throughout. Two girls both begin and finish taller than the third. The only crossing of the individual curves is in the case of the shortest boy, who at seventeen is taller than the shortest girl, who, up to the age of fifteen, was the taller.

In such measures of mental characteristics as have been made up to the present time (essentially measures of abilities rather than of attitudes), the rule holds no less rigorously. Whether measured by achievement in academic courses, honors in professional and technical courses, salary earned after graduation, or inclusion in directories of eminent persons, success in later life is suggested by success in the early work of the school curriculum, when the fields of activity are otherwise comparable.

Measurements of the rate of growth in intelligence have now been possible, for many years, at least in the sense that *comparative* rates of growth may be secured. Comparisons of the development of inferior intelligence with the average are now abundant. Such comparisons in the case of the gifted and the average are at present being accumulated at a very rapid rate. The accompanying actual and "hypothetical curves" [3] of growth show very clearly the results of such comparisons.

Using the same units or steps of measurement with the feeble-minded, the normal, and the gifted in intelligence, of the kind measured by available intelligence tests, the same results are found that were indicated by the curves of stature increase. The intelligence that is ultimately inferior was inferior in the beginning, as early as measurements could be applied. And the superior intelligence was superior throughout childhood. The differences even become magnified or more apparent as development proceeds. Moreover the inferior curve stops short or flattens out, attains its maximum, earlier than does that of the normal, while the growth of the initially superior intellect continues beyond a point at which the normal or average growth ceases.

The first set of curves, from Baldwin and Stecher, shows the rate of mental growth of superior and average children in intelligence, from the age of five years to that of fourteen years, these being individuals, repeatedly measured. Since the measurement units are months of development, the curves do not show the actual *form* of the growth curve, in absolute terms. They do however

[3] See Pintner, *Intelligence Testing*, p. 68, for a discussion of hypothetical growth curves for intelligence.

show that, using the same units, individuals maintain their initial standing with respect to one another. At the age of five the superior children are ten months ahead of the average; by the tenth year they are twenty months ahead; by the age of fifteen the curves show that they will be thirty months ahead. That is to say, their proportionate superiority is maintained.

The "hypothetical curves" are based on many such findings as these, except that they attempt roughly to indicate the absolute rates of growth as well as the relative positions of superior, average, and inferior individuals.

5. *Breaks in continuity are more commonly due to extrinsic rather than to intrinsic factors, and some features are more amenable to such influences than are others.* Interruptions and spurts of development, that is to say, are usually due to the intrusion of irregular environmental influences. Such irregularities easily occur, and they may without great difficulty be given spasmodic and intermittent form, or appear as brusque and sudden changes.

Thus such episodes as going to school, being born, beginning to shave, learning to smoke, donning adult clothing, leaving home for boarding school, falling in love, death of an intimate friend or relative, onset of various diseases, a profound fright, and being drafted into the army, do not insidiously steal upon one. They are more likely to be abrupt occurrences, and to represent sudden changes, not in the intrinsic, but in the extrinsic factors of development.

When sudden developmental changes seem to violate the general rule of continuous transition, their explanation should first be sought among environmental factors, rather

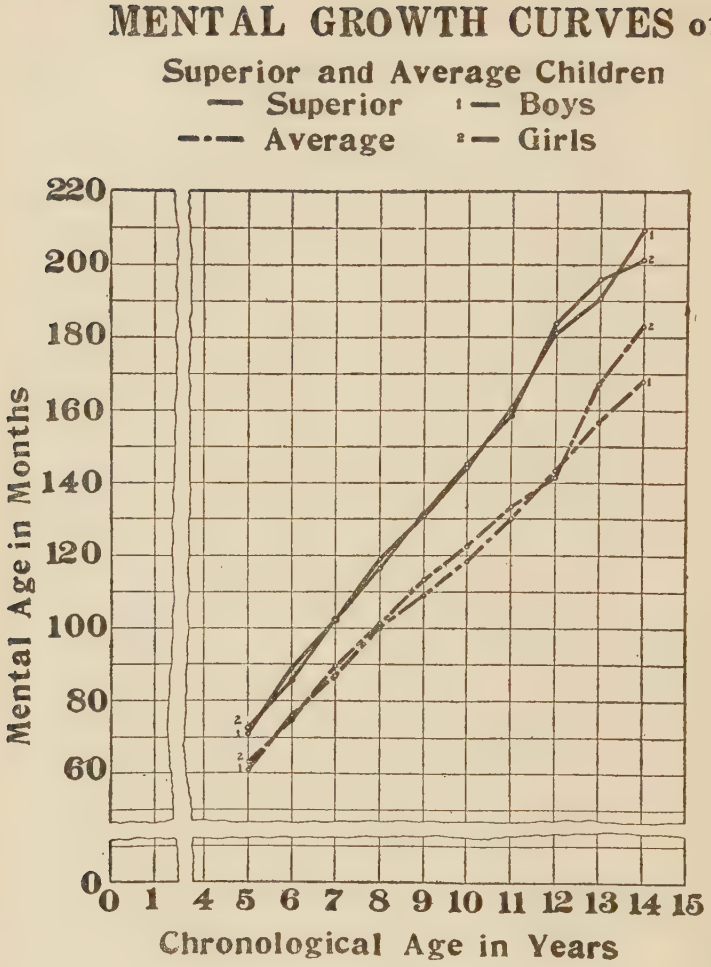

FIG. 5.—GROWTH IN MENTAL AGE.

(From Baldwin and Stecher, "The Mental Growth Curve of Normal and Superior Children," University of Iowa Studies in Child Welfare, II, No. 1. Reproduced by permission.)

than attributed to the intermittent vagaries of inner urges and "life forces." That some features are more amenable to these extrinsic factors may be very simply illustrated, among physical traits, by the comparison of height and weight. Scarcely can a cubit be added or deducted

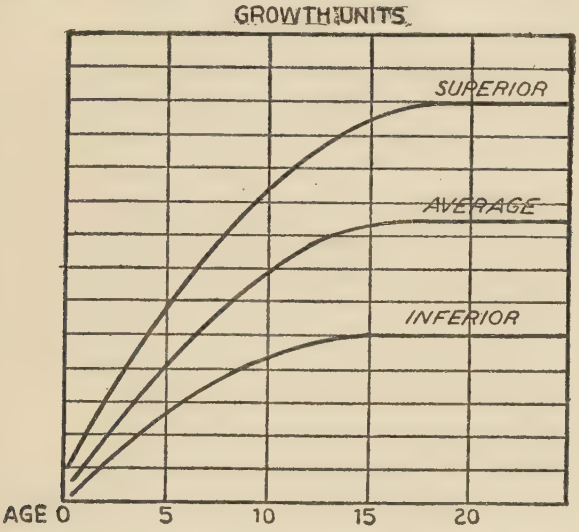

FIG. 6.—HYPOTHETICAL CURVES OF MENTAL GROWTH.

Showing the observed differences in (*a*) initial status; (*b*) developmental pace; (*c*) period of growth; and (*d*) final limits of attainment, in the case of individuals who are superior, average, and inferior in intelligence.

from one's stature, although weight is modifiable within wide limits by exercise, diet, and medication.

6. *Correlation rather than compensation is the developmental rule.* That the feeble-minded,[4] the inferior in intelligence, are also feebler in body, shorter in stature,

[4] L. S. Hollingworth, *Psychology of Subnormal Children*, chap. viii.

lighter in weight, more susceptible to disease, shorter-lived, and less resistant to the damaging influences of drugs administered to them, is no developmental anomaly. Instead it but illustrates the general rule. It is also true, as recent elaborate measures,[5] extended over a period of years have shown, that children who are unusually gifted with intelligence are also, on the average, taller and heavier, more comely and better shaped, more agile, and stronger, in foot pounds of work accomplished, than are children of normal intelligence, of the same sex, age, and race.

Studies of adults have also shown that those most resistant to distraction, least susceptible to drug influences, and least prone to neurotic involvement under strain, are the individuals who are the best in normal achievement tests, the most rapid learners, and the most intelligent by measurement. Such measures of "character traits" as have been adequately devised show also a positive correlation of these features with other desirable traits.

That organic quality is manifested in development cannot be doubted in the face of such evidence.[6] As a rule, development of one feature is not made at the expense of others. Instead it seems, if not actually to facilitate their own growth, at least not to deprive them of their own superior impetus.

Perhaps the only exception to this rule may be encountered in the fields of interest and dexterity. Since time is short and life is fleeting, not all interests and dexterities may be cultivated. This, however, is not a true develop-

[5] L. S. Hollingworth, *Gifted Children;* Terman, *Genetic Studies of Genius.*

[6] Gates, *Elementary Psychology,* chap. xix.

mental phenomenon, it is merely an unfortunate limitation placed upon human accomplishment. The capacity for one interest or aptitude is more commonly an index of capacity for others as well.

Evidence showing the positive correlation of intellectual capacity with various physical characteristics is shown in Chapter VI, in connection with the nature of deficiency and talent. Studies [7] of adults differing in such traits as estimated Intelligence, Beauty, Humor, Refinement, Neatness, and Sociability show these traits to be positively correlated also.

That drug resistance is positively correlated with general mental level is shown by a long array of experimental studies of the effects of drugs. Thus in an investigation [8] by the writer, six people were measured for susceptibility to alcohol effects, and also for their general ability in mental tests and for their capacity for improvement through practise. The results were as follows:

TABLE I

Subject	Rank for Susceptibility	Rank for Mental Competence	Rank for Learning Ability
A	1	6	6
B	2	4	5
C	3	3	4
D	4	5	3
E	5	1	1
F	6	2	2

[7] H. L. Hollingworth, *Vocational Psychology*, chap. vii; *Judging Human Character*, chap. iv.

[8] H. L. Hollingworth, "The Influence of Alcohol," *Journal of Abnormal and Social Psychology*, October, 1923, and January, 1924. See also Snoddy, "Learning and Stability," *Journal of Applied Psychology*, March, 1926, p. 29.

Subjects A and B, who are the most susceptible to alcohol, stand at or near the bottom of the list both for mental ability and for capacity for improvement. Subjects E and F, who are the least susceptible, stand at the top of the lists both for ability and for gain. Subjects C and D, who are intermediate in susceptibility, are also intermediate in mental ability and in capacity for learning.

Studies of individuals with psychoneurotic complaints show these individuals commonly to be of less than average intellectual competence. The degree of intelligence also exercises a determining influence on the nature of neurotic complaints. Thus Tendler,[9] studying groups of civilian patients, found the median mental ages of the three groups, Neurasthenia, Psychasthenia, and Hysteria, to be respectively 11.0, 12.0, and 13.7 years, in comparison with an average of 14.0 to 15.0 years of mental age attributed to the normal adult. Examining over 1,000 cases of soldiers with war neuroses of the functional form, the writer [10] found results shown in Table II.

These results confirm the general clinical findings, to the effect that although individuals with any degree of intelligence may become involved in neurotic difficulties, the tendency is much greater in the cases of humble intelligence. And the lower the intelligence level, the more likely is the picture to take the form of overt bodily incapacity.

The tendency toward correlation rather than compensa-

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[9] Tendler, "The Mental Status of Psychoneurotics," Archives of Psychology, No. 60 (March, 1923), p. 33.

[10] H. L. Hollingworth, *The Psychology of Functional Neuroses*, chap. vi, 1920.

TABLE II

Diagnosis	Median Education	Per Cent with No Education	Average Mental Age
Hysteria	Fifth Grade	23	11.9 Years
Obscure Epilepsy	Sixth Grade	23	12.0 Years
Psychopathic Constitution	Seventh Grade	13	12.5 Years
Psychoneurosis Undiagnosed	Seventh Grade	11	12.6 Years
Neurasthenia	Eighth Grade	5	13.0 Years
Concussion with Psychoneurosis	Eighth Grade	5	13.0 Years
Psychasthenia	Ninth Grade	0	14.9 Years

tion in general development is clearly illustrated by Baldwin's findings,[11] that "there is a positive correlation between physiological stages of maturation and anatomical age"; that "physiological age is . . . directly correlated with stages of mental maturation"; and that "the mental age of the individual bears a direct relationship to the physiological age as indicated by height and weight." Thus "at each chronological age the physiologically accelerated . . . have a higher mental age than those of the average or below the average physiological age."

The results of numerous investigations[12] into the correlation of various human traits, made during the past quarter century in the main, are briefly summarized by Gates[13] in the following words:

[11] Baldwin, "The Physical Growth of Children from Birth to Maturity," University of Iowa Studies in Child Welfare, I, No. 1 (June, 1921), pp. 196-197.

[12] See, for example, the following: Wissler, "The Correlation of Mental and Physical Tests," *Psychological Review Monograph Supplement*, III (1901); Carothers, "Psychological Examinations of College Students," Archives of Psychology, No. 46 (1921).

[13] Gates, *Elementary Psychology*, p. 580, 1925.

General mental ability . . . is positively associated more or less with other desirable traits. If the problem had been taken up from another point of view, such as the correlations of other traits with morality or artistic ability, the same *general* result would have been found, namely, all desirable traits tend to be associated with one another. The correlations are not equal, however, and they are often low. . . . Specialization there is; we all have our particular strengths and weaknesses. But on the average, weakness in one trait implies weakness in others; mediocrity in one implies mediocrity in others, and strength in one, strength in others.

The fact that these general tendencies toward correlation of traits are present, rather than evidence of a tendency toward compensation, does not mean that there are not numerous individual variations. Developmental asymmetry is entirely possible, and a given individual may be more advanced in one respect than in others, or more retarded. Unless correlations are practically perfect, the separate features cannot be used in a predictive way. That is, the status of a particular individual cannot safely be inferred in one set of traits from his measurements in other traits. In spite of the general presence of an organic quality, and of general tendencies to positive correlation of desirable traits, there is much leeway for individual irregularity, since such correlations, while positive, are often low.

This is illustrated in the findings of Gates [14] in connection with various types of maturity in a group of about sixty school children of kindergarten age. The measures included those of anatomical age, physical maturity,

[14] Gates, *et al*, "Educational Significance of Physical Status and of Physiological, Mental, Emotional and Social Maturity," Teachers College Record, May, 1924, pp. 223-239.

emotional maturity, social maturity, mental ability, and educational status. All these measures were compared, and the results led the investigator to conclude that "growth is specialized and has many phases. In so far as physical status, mental age, educational age, and estimated mental, physical, social, scholastic and emotional maturities, as here secured, represent phases or types of growth, the conclusion apparent is that growth is not everywhere uniform and single, but varied and, in different degrees, independent." It is clear then that in spite of general tendency to correlation, each feature, in its development, must be independently studied and evaluated.

CHAPTER IV

STAGES OF HUMAN DEVELOPMENT

LONGITUDINAL AND CROSS-SECTION METHODS

In following the development of any complex structure or function, phenomenon, or institution, one of two available methods must commonly be arbitrarily adopted. These two methods we may designate: (*a*) the method of cross section, and (*b*) the longitudinal method. Müller-Lyer,[1] in his account of the history of social development, calls these the *horizontal* and the *perpendicular* methods.

Thus, in the horizontal method, the method of cross section, one might, in studying social development, take in turn the successive periods of human history. Within each chronological period a study might be made of such institutions as clothing, labor, exchange, transportation, labor organization, the family, education, religion, and so on. The sense of movement and direction would be given only in the steps from earlier to later periods.

By the perpendicular method, instead, some single institution, such as clothing, would be selected first. This institution would be studied in its development throughout the course of human history. Any indication of stages of growth, which might be adopted, would be due to intrinsic changes in the institution itself, without special

[1] Müller-Lyer, *History of Social Development*, pp. 62-64, 1921.

reference to chronology, and with but scant reference to the simultaneous development of phenomena in other fields. Each institution would in turn be submitted to this longitudinal survey.

Each of these methods has its advantages and its disadvantages. Thus in developmental psychology we might take the longitudinal approach in our study of language, of artistic ability, of play, of reasoning, and the like, tracing out the growth of each in relative independence of the others. In this way we should be constantly retracing our steps, moving through the course of human life for each topic studied. This would have the advantage of observing the continuity inherently characteristic of development, and of contributing a distinct sense of movement and process. It would have the disadvantage that the complex interrelations of the different topics would not easily be perceived, nor their mutual influences readily recognized. The method might moreover prove long and tedious for those whose interests were not of the highly specialized but instead of the general survey type.

Instead of this perpendicular or longitudinal method, it seems wise, for the purpose of our general survey, to adopt the horizontal or cross-sectional method. We shall attempt to mark off certain convenient developmental stages or epochs, and to get as clear a picture in each of these of the progress of the most important and interesting characteristics, and to discern their interrelations.

We require first, then, a designation of the chief developmental stages in the growth of the human being, especially with respect to his psychological traits and activities. We may be sure in the beginning that the indication of such stages or epochs will be more or less arti-

ficial, since growth is not by sudden transitions, but by gradual changes and continuous modifications.

Thus on a map of a given state or region, we mark off the different "counties" as distinct units. But these boundary lines do not conform in any close way to the geography of the country. The lines cut across rivers, divide hills, valleys, trees, and sometimes even run through the middle of villages, streets, and buildings. Nevertheless the county lines serve a useful purpose if one does not misuse or misinterpret them. They reflect not the natural geographical conformations, in the main, but are *imposed upon* this natural geography by extraneous considerations. And so far as is convenient they do take advantage of natural features, such as streams and mountain ranges.

We may surmise in advance that the "developmental stages" of the human personality will in like fashion be demarked, not by innately determined leaps of the life impulse, but rather by the occurrence or incidence of various extrinsic factors, which, because of their relative abruptness or arbitrariness, seem to deflect the natural course of development. Many persons have tried to indicate landmarks of human development, and thus to lay off the chief developmental stages. The results vary somewhat, according to the purpose or dominant interest of the investigator. Most conspicuous among these have been what we may term the "dramatic," the "social," the "educational," the "endocrine," and the "actuarial" interests.

DRAMATIC APPROACHES

The "dramatic" approach is represented by the artist and poet, who look at human life more or less from the

point of view of its dramatic possibilities. A vivid example of this point of view is represented by Shakespeare's description of the "seven ages of man," in Act II, Scene 7, of "As You Like It." This is so classical an analysis that in spite of its general familiarity it is worth while quoting here.

All the world's a stage,
And all the men and women merely players:
They have their exits and their entrances,
And one man in his time plays many parts,
His acts being seven ages. At first the infant,
Mewling and puking in the nurse's arms.
Then the whining school boy, with his satchel
And shining morning face, creeping like snail
Unwillingly to school. And then the lover,
Sighing like a furnace, with a woeful ballad
Made to his mistress' eyebrow. Then a soldier,
Full of strange oaths, and bearded like the pard;
Jealous in honor, sudden and quick in quarrel,
Seeking the bubble reputation
Even in the cannon's mouth. And then the justice,
In fair round belly with good capon lined;
With eyes severe, and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age shifts
Into the lean and slippered pantaloon,
With spectacles on nose and pouch on side,
His youthful hose, well saved, a world too wide
For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything.

SOCIALIZATION APPROACHES

From the point of view of social impulses and the interest in the socialization of the individual, Kirkpatrick [2] indicates six important stages. These do not match the periods delineated by Shakespeare at all, being for the most part finer subdivisions of the earlier part of life. He writes, "The most fruitful basis, therefore, for distinguishing the different stages of human development for psychological and educational purposes is the presence and prominence of the more important social impulses and the social influences acting at different periods." The periods which he indicates on this basis are the following:

1. *Presocial,* "during which the child is influenced by things and persons, as are animals, in an almost wholly objective way, and only slightly or not at all by the thoughts and feelings of the persons around him."

2. *Imitative and Socializing.* This period closes at about three years. During it "the child becomes more and more susceptible to mental influences and his mental states are determined to a considerable extent by the mental states of those around him."

3. *Individualizing.* This stage culminates at about the sixth year. During it "the conscious personality that has been developed during the previous period becomes more distinctly individual and asserts itself, instead of merely assimilating the characteristics of others."

4. *Competitive Socialization,* ending at about 12 years. "It is a period when a child is introduced to a wider social environment and in which the impulses to excel in competition are prominent and are brought out in association with others of the same age."

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[2] Kirkpatrick, *The Individual in the Making,* 1911, pp. 59-60. (Adapted by permission.)

5. *Pubertal or Transitional Period,* up to the eighteenth year. "During this time the youth and maiden become more susceptible to many social influences that formerly affected them not at all, and many new and important interests develop that are characteristic of the sex and age."

6. *Later Adolescence,* ending at the twenty-fourth year, "during which the individual is ushered into the larger world of thought and action and becomes prepared to take his part in the various activities of the race as a fully developed man or woman."

Kirkpatrick's divisions are especially valuable inasmuch as they recognize clearly that developmental divisions are the result of the "extrinsic" rather than of essentially "intrinsic" influences. He expressly indicates this, and also suggests that "the descriptions best fit the children of America," and that "the duration of the different stages is subject to great variations in the different races, in different social conditions and still more in different individuals."

EDUCATIONAL PERIODS

Stages of development as conveniently indicated in the interests of education, may be illustrated by the account of Thorndike, who calls attention to the roughness of the lines of demarcation, and stresses the wide deviation of children at the same physical age. Hence in talking of the *average* individual it is always to be borne in mind that there are wide deviations from this central tendency, and Thorndike advocates presenting the whole array of cases at a given age, rather than formulations based on the typical individual.

Thorndike, with these and other cautions, indicates

six stages, as did Kirkpatrick, although the two analyses are not entirely alike. Thorndike's stages are as follows:[3]

A—Infancy, birth to 1 year or thereabouts, probably represents a stage of mental life comparable to that of the lower animals.

B—Babyhood, from 1 or thereabouts to 5 or thereabouts. In this period the general human functions appear.

C—Childhood, from 5 or thereabouts to 12 or thereabouts. In this period the child can supply his own physical wants to such an extent that he can be left without the care needed in stages A and B.

D—Transition, from 12 to 14 or thereabouts. Here there are probably rapid changes in his mental as well as physical make-up.

E—Early Adolescence, from 14 to 18 or thereabouts.

F—Later Adolescence, from 18 to 25 or thereabouts.

In these last two stages we have the broader life due to new functions.

The various differences between these three indications of developmental stages, the dramatic, the social, and the educational, may be shown by comparison of the ages which terminate the successive epochs. The following points seem to afford this comparison:

Author	*Terminal Points of Epochs in Years*								
Shakespeare.....	5			15		30	45	60	75
Kirkpatrick.....	1	3	6	12	18	24			
Thorndike.....	1	5	12	14	18	25			

ACTUARIAL EPOCHS

What may be called an actuarial division of life into stages takes account of the "chances of death" rather

[3] Thorndike, "Notes on Child Study," *Columbia University Contributions to Philosophy, Psychology and Education*, VIII (1903), iii, iv, pp. 13*ff*.

than of the processes of life. Thus Karl Pearson [4] gives a curve showing the number of deaths, at each age, of 1,000 individuals born in the same year (males). The total curve of mortality is analyzed into component curves, centering at different life epochs, and suggesting a somewhat different array of causes of mortality.

A graphic picture is portrayed (and illustrated in a frontispiece) of these "five Deaths," who aim at different target ages, with varying degrees of concentration, accuracy, and skewness. Death is thus conceived as a series of marksmen, "firing at the living column crossing the Bridge of Life," and aiming "at different portions of the column of life,—that is, at different ages."

The mortality of old age aims, as with a rifle fire, at a section between the sixty-seventh and the seventy-second years. Middle age mortality aims at the forty-second year, as with a blunderbuss. The mortality of youth shoots, as with an arrow at the twenty-third year. With the concentration of a machine gun the mortality of childhood aims at the kindergarten age; and in the high mortality of infancy "the center of Death's aim is the beginning of the last antenatal month." In addition, there are estimated to be 605 cases of antenatal mortality for every 1,000 cases surviving birth. The marksman of infantile mortality "strikes down the young life with the bones of its ancestry."

"Instead of seven, we have five ages of man, corresponding to the periods of infancy, of childhood, of youth, of maturity or middle age, and of senility or old age." The numbers of deaths in 1,000 in each of these periods

[4] Pearson, *The Chances of Death, and Other Studies in Evolution*, I (1897), pp. 1-41.

are 246, 46, 51, 173, and 484 respectively. "In the case of each of these periods we see a perfectly regular chance distribution, centering at a given age, and tailing off on either side."

ENDOCRINE DIVISIONS

Among the various attempts to portray the stages of human development we may also refer to the recent more or less bizarre and premature speculations concerning the influence of the endocrine glands and their secretions upon growth. That the conclusions outreach the limits of demonstrable evidence at present does not make the attempt any the less suggestive, since it does appear that glandular activities are closely related to general development.

The freest of these interpretations is that given by Berman in a recent volume,[5] in the following words:

> What transfigures the individual as the years go by is no simple wear and tear of the tissues, nor the replacement of old cells by new. It is the rearrangement of relationships among the ductless glands, the shifting of influences from the predominant to the subordinate, and vice versa, in the constellation of the internal secretions, that determines the unfolding of personality. What actually happens in the changes from childhood to adolescence, from adolescence to maturity, and so on, is the sloughing of one internal glandular dominance for another.

He then indicates the following five developmental periods on this basis of glandular dominance:

1.—"Infancy as the epoch of the thymus." "The thymus is the great inhibitor of all the glands of internal secretion.

[5] Berman, *The Glands Regulating Personality*, pp. 256*ff*. (Copyright, 1911, by the Macmillan Company. Quoted by permission.)

By its checking activity upon the other members of the endocrine system, it gives the baby time to grow in bulk. . . ." "The function of the thymus, at a maximum during infancy, seems then to be to restrain the differentiating endocrines, until sufficient material has been accumulated by the organism upon which the differentiating process may work."

2.—"Childhood as the epoch of the pineal." This gland is supposed to "take the place of the thymus (which begins to shrink after the second year) as a brake upon the forward driving impulses of the other endocrines." . . . "Since it is especially a sex gland inhibitor, the thyroid and pituitary become freer to exert their influences than under the thymus régime."

3.—"Adolescence as the epoch of the gonads." This is "the period of stress and strain throughout the somatic and psychic organism because of the volcanic upheavals of the sex glands. The history of the individual is dominated by them up to twenty-five or so, when maturity commences in the sense of a relative sex stability."

4.—"Maturity as the epoch of whatever gland is left in control as the result of the life struggle." ". . . life episodes and crises, diseases, accidents, and struggles, experiences of pleasure and pain, as well as climatic factors, settle finally which endocrine or endocrines are left in control as a consequence of the series of reactions into which the period of maturity may be analysed."

5.—"Senility as the epoch of general endocrine deficiency." "Senility inevitably follows maturity . . . because of the process of degeneration which ultimately overtakes all the glands of internal secretion, dominant as well as subordinate."

In addition to the cautions concerning the inadequacy of our knowledge concerning the endocrine influences, it may be pointed out that even according to the foregoing vivid account, these glands themselves are subject to an underlying process. Their serial dominance and subordination, and their final degeneration remain unaccounted

for. The endocrine system itself displays the phenomena of development, just as do other parts of the organism. And it is itself, it would appear, subject to the influence not only of other intrinsic factors, but to that of various external agents as well. It seems fairly clear then that in the long run the endocrine system is a product, rather than a mechanism of development, and must be studied as only a part of the general developmental process. It seems to afford no better basis for the account of developmental stages than do such features as eruption of teeth, acquisition of vocabulary, habits of clothing or schooling, or the varieties of play activity.

TEN SIGNIFICANT LIFE PERIODS

Since studies of mental growth have been heretofore made mainly in the interests of education, and since education, in the formal sense, usually ceases with the completion of later adolescence, there has been little attempt to classify later stages of development, or even to study these periods with care.

But we are interested in the general psychological picture, as well as in educational problems and social implications arising therefrom. We must therefore add several later developmental stages, which are commonly recognized in popular speech, or which will at least be clearly recognized from the names used for them. These will be the periods of maturity, of senescence, and what we may designate the post-mortem period.

Moreover, since we are interested in the sources and origins of the individual's characteristics, as well as in his career and destiny, we shall need to indicate stages

earlier than those recognized in the dramatic, educational, and social analyses. These will be especially the fœtal period, between conception and birth, and the period of the germ plasm, in which are laid down the hereditary factors that will influence subsequent development.

Our intermediate stages, more or less arbitrarily chosen, but in part dictated by extrinsic episodes which will be made clear as we proceed, will not correspond precisely to any of the divisions we have already described. For our present purpose we may conveniently recognize ten developmental stages, rather than the six or seven of the prevailing divisions. These will be as follows:

HUMAN DEVELOPMENTAL STAGES

Period	*Description*
1.	The germ plasm—The career and permutations of germinal elements, representing biological heredity, and the contribution of determinants by near and remote ancestry.
2.	The fœtal period—The life of the embryo, from the moment of conception or ovum fertilization, to the time of birth.
3.	The infant—The "neonate" or newborn individual, in its first few weeks or months of life.
4.	The babyhood age—The first three years of life, up to the point which, if the individual does not intellectually pass, he remains an "idiot."
5.	Questioning age—Centering at about the time of customary school entrance, at the sixth year, the point which, if the individual does not intellectually pass, he is characterized as an "imbecile."
6.	"Big Injun" age—Culminating at about the eleventh year, the point which, if the individual does not intellectually pass, he is described as a "moron."
7.	"The Awkward Age," adolescence—The typical high-school age, terminating at or around the eighteenth year, with wide variations.

8. Maturity—The long stretch of economic, political and domestic responsibility, running up to seventy years or thereabouts.
9. Senescence—The period of decline, and in some cases of involution or senile decay.
10. Post-mortem age—That period, brief or prolonged, in which the personal influence of the individual persists and the institutions he has had a part in establishing remain effective.

THE CONCEPT OF DEVELOPMENTAL STAGES

It has been the current fashion to object to any division of human life into stages. Such protests were in part motivated by the recognition that, as we have already insisted, development is continuous, not sharply marked off into periods. But the protests were also justified by earlier errors of speaking as if the "stages of development," which might conveniently be recognized, were necessary and inherently determined epochs of growth. It is, however, as great an error not to recognize developmental stages as it is to overemphasize them. Since we are to use the concept of stages in this book, it may be well once more to indicate the justification of our method.

Stages of human development, as we consider them, are not laid off by the occurrence of spontaneous inner spurts or abrupt qualitative changes in the direction of the life urge. Instead, as we have already pointed out, they are chiefly determined by the more or less sudden episodes and exigencies of social life. They are in the main extrinsically rather than intrinsically determined. But they are nevertheless discernible, and are not entirely arbitrary on the part of the author. When Robinson Cru-

soe was shipwrecked on his lonely island, a very genuine new stage began in his life, and the development of his attitudes, his knowledge, and his skill took a new direction. When he was subsequently rescued, another stage clearly took the place of this, and the phenomena of relearning constituted a very genuine developmental process. So in the life of every individual, domestic, educational, vocational, pathological events clearly mark off developmental stages. We have but used some of the more common of these in indicating the developmental periods of the individual. Only a biased obstructionism can object to this procedure, so long as its limits are recognized and the exaggerations of the earlier genetic psychology avoided.

The period of the "germ plasm" with its inert determiners is abruptly terminated by the event of conception, the fertilization of ovum by sperm. The fœtal period is abruptly terminated and very marked developmental shifts are occasioned by the "accident" of birth. Ability to walk quite commonly comes with a certain suddenness, and this change from a creature to whom everything has to come, to one who can actively approach other places more or less at will, gives a fairly definite termination to infancy. Leaving mother's knee and taking up one's abode in the schoolroom, under the influences of disinterested teachers and strange playmates, is a real event that often happens with painful abruptness and terminates babyhood by the intrusion of a new diversity of influences. The completion of the "grades" is so signal an event in the life of fully half of the race that it is commemorated by "exercises," "working papers," and similar significant acts; in the other half the decision to go on to further education

of the school type, the selection of a preparatory or high school, and often the actual departure from home to the boarding school, do much toward ending the questioning age as we have described it. The succeeding period, while it is to be sure not abruptly terminated by the phenomena of puberty, nevertheless brings with it, as we shall see, fairly sudden changes in social expectation and treatment. The approach of maturity, signaled by the purchase of a workman's "dinner pail," the beginning of regular hours of toil under a "boss," or by the entrance upon the life of college, is also a genuine event. No less so are the termination of maturity and the dawn of senility, marked by abrupt loss of position, retirement, or disqualification. And death is even a more genuine developmental event than is birth. With these facts in mind, we need make no apology for our division of life into stages.

CHAPTER V

HEREDITY AND THE GERM PLASM

GENERAL FACTS OF HEREDITY

The individual is a product of developmental processes that are already in operation long before his particular existence begins. New life does not actually begin with him; instead he is but the flower of life that is already in action. He is but a wave upon that stream of life that reaches ages back into time, to that unknown era when life began. Many of the factors that determine his individual development have been in operation in countless ways before his own time begins. It is the operation of these preindividual determiners that we designate by the term heredity. By an individual's biological and psychological inheritance we mean those characteristics which he possesses by virtue of his ancestry. By heredity we mean essentially the continuity of the germ plasm, and the fact that much of an organism's make-up is determined by features laid down in the sperm and ovum which in their combination and further development constitute or produce that organism.

The general facts of heredity are familiar.[1] Hens' eggs do not hatch out butterflies, nor will the children of Chinese parents be negroes. Like comes from like, in the

[1] Conklin, *Heredity and Environment*, is recommended as a useful collateral reference.

long run. The general make-up and many of the special traits of the individual are determined or given in the germ plasm of his two immediate parents. We mean by the germ plasm those portions of the body that produce the ova in the case of the female and the sperm cells in the case of the male, which cells develop into the tissues, including the germ plasm, of the new individual.

BIOLOGICAL HEREDITY

This germ plasm is distinguishable from the soma, or the rest of the body at a very early stage of growth, and becomes specialized for its particular reproductive function. Children are not produced from the parents' heart or muscles or brain, but from the germ plasm of these parents. What happens to the other tissues during the parent's life seems not to influence the properties of the germ plasm in any direct fashion. The characteristics of the germ plasm were determined by the germ plasm of the grandparents, and the germ cells will tend to reproduce those characteristics which belong to the soma of the body of which they are part. The precise manner in which this is done, and the complications resulting from double parentage (sexual reproduction) comprise an elaborate field of investigation and knowledge, which cannot be even summarized here. Special books [2] on the mechanism of heredity and reproduction must be consulted for more detailed accounts than we shall give.

Some general principles, however, have a fundamental importance for developmental psychology. Thus the acquired habits of our parents seem to be shed when they

[2] Thompson, *Heredity*, 1913; Conklin, *Heredity and Environment.*

die. We inherit only those tendencies with which they were themselves endowed at birth (subject to the complications of combined parentage). We do not directly or through heredity profit from their learning, their exercise, nor suffer from their vicious habits.

Under the influence of combined parentage, and through the mechanism of heredity, results may accrue which do not closely resemble immediate parentage. Fortunate combinations of parentage may produce unique or novel pictures of accomplishment. Through this same set of factors it happens that every individual produced is unique (the most apparent exception being in the case of identical twins).

Since germ cells are themselves living bits of protoplasm, they are also subject to various influences, most of which are unknown to us or beyond our control, and they therefore display among themselves the phenomenon of variability. In the long course of evolution new traits have appeared in some manner which makes them in their turn hereditary. How this happens is still a matter for persistent biological research, speculation, and controversy. Strictly speaking, then, like does not produce exactly like, but somewhat like.

In a general way, then, what we become depends first of all on what we come from. As Cattell aptly remarks, "Nature determines what a man *can* do; Nurture determines what he *will* do." Millions of years ago, presumably, it was determined that a given individual, if he should occur, would be an animal, not a plant; ages ago, that he would be a vertebrate, not a mollusk; long since, that he would be a mammal, not a fish; several thousand years ago, that he would be a biped, a primate, a man;

still more recently that he would be a white man, not a pygmy; and only within recent epochs, that he would have brown eyes, a good ear for music, and a high intelligence. But all these were determined long before he was born.

For the germ plasm, we are taught, is continuous with the earliest forms of life. It bears in itself a multitude of determining factors and tendencies, giving rise to a variety of organs and structures, enabling a host of activities and functions. In this sense, at least, the individual bears in his make-up the history of his species. In this sense the experiences of the race are echoed in him. In this sense, among others, he is a repository for all that the race has learned.

In this sense the individual is the product of all that has gone before him, or at least of certain lines of development that preceded him. He will eat flesh and vegetation, rather than inorganic substances, because of his animal heredity. He will live on land, breathe the air, and only occasionally take to the water, because long ago the forbears of his structure and his tendencies passed their fishlike origins. But his embryo will show gill slits like those of the fish embryo, vestiges which he will ordinarily have developed quite beyond long before the day of his birth.

He will live on the ground rather than in the trees (by preference at least) for his structure and tendencies will have passed far beyond those of the ancestors from which he and the simians supposedly sprang. But not for four months or so after birth will he oppose thumb to fingers, showing up to that time the characteristic apelike claw hand. Even to his death he will bear in his skeleton the vestigial tail bones suggesting an active prehensile

organ now lost to him. He will, to be sure, walk erect after a year or so of life, but up to that time he will crawl on all fours, even more awkwardly than the quadrupeds.

He is equipped throughout life with a multitude of devices, his reflexes, his sense organs, his retentive powers, all of which were predetermined for him. He will apparently show certain native curiosities, fears, resentments, and fondnesses, because his remote ancestors found them satisfying or expedient. Depending on whether or not his immediate parents were color blind, or feeble-minded, or insane, musical, hot-tempered, of a roving disposition, he may find himself either quite fixed, or at least predisposed in one or another direction, and possessing or not possessing one or another capacity or virtue.

SOCIAL HEREDITY

We must add to all this the facts that the individual will be born into an established social order, will be taught from an early age a given language, supplied with certain concepts, ideals, values, standards of conduct; he will be governed inexorably by established customs and usages, laws and institutions, will find available certain foods, certain occupations, inventions, and tools; from infancy onward certain of his inherited tendencies will be vigorously suppressed and punished, others stimulated and encouraged; certain uninherited habits will be impressed upon him so firmly that he can never recover from them. When we bear all this in mind we sense at once the complications of the developmental problem.

He is pushed from behind with the urges of the past.

He is received into an environment that takes him in hand even before he can open his eyes and dominates him until he is well through adolescence, even then only slackening the reins a bit here and there.[3] With these facts in mind we shall marvel at the audacity of our ambitious forefathers who proclaimed that all men are by nature free and that they are also equal. We may be surprised indeed if our individual meets with even a modest success in attempting to develop for himself and by himself a personality of his own, and in facing the facts of life with an unbiased outlook, an open mind, and a creative impulse.

HEREDITY AND MENTAL FEATURES

The more problematic aspect of heredity, as a developmental factor, is encountered when we inquire concerning the relative importance of immediate as contrasted with remote ancestry, and concerning the minuteness of the details that are thus determined.[4] That our range and mode of sensory capacity, our memory operations, our emotional equipment and repertoire, our distinctively human modes of learning, are in a general way determined by the human stock from which we spring, is obvious. But to what degree can such influences be attributed to particular ancestors, or revealed by them? And are the precise *degree* of sensory acuity, the *degree* of retentiveness, the *strength* of *specific* emotional tendencies, and the particular limitations in speed and permanence of learn-

[3] The following are useful collateral references: Sumner, *Folkways*, 1906; Read, *The Origin of Man and His Superstitions*, 1920; Goldenweiser, *Early Civilization*, 1922.

[4] Thorndike, *Educational Psychology;* Wiggam, *The Fruit of the Family Tree;* Holmes, *The Trend of the Race.*

ing, displayed by a given individual, also thus determined?

The same problem arises in connection with structural characteristics, where our knowledge of heredity and its mechanism is presumably more precise. That our general bodily architecture, our bilateral symmetry, the general array, location, and shapes of our bodily organs, the number of our fingers, the arrangement of our teeth, and the like, are due to our human lineage is beyond doubt. And the determiners of these features may be traced far back into that lineage. How about the length of those fingers, the quality of the teeth, and the particular functional capacity of those various organs? The determination of such features cannot be traced so far back into the individual's lineage.

In general we may suppose that the earlier in the individual's life an inherited feature appears the more remote in history is the origin of its determination. And we have also seen that some features are more amenable to the influence of extrinsic factors than are others. Some features are thus generic or racial, some are specific or familial, while others are peculiar and individual. The general shape and disposition of one's bones is perhaps less amenable to extrinsic influences over which we have control than is the proportion of calcium they contain.

Morphological traits represent the organism at rest, its structure and architecture. Psychological traits represent the organism in action, and in action of a particular mode. Functional features, representing the organism in action, are more amenable to environmental influence, and to such factors as exercise and stimulation, than are structural characteristics. At least the influences that thus modify

the former are at present under better control, and their efficacy does not cease so early in the lifetime of the individual. Thus the length of the adult arm is pretty completely determined at birth, or earlier, but its girth and strength are open to subsequent determination, as are also its steadiness and coördination. The developmental limit of these latter features may indeed be early determined, but the degree to which this limit is realized will vary with opportunity and exercise, and with such exigencies as education and disease.

Structure itself is not directly inherited. Only the *determination* of structure is present in germ plasm. Only in an indirect sense, therefore, is even structure inherited; it is *determined* by ancestry. Now mental traits are not structures. They, however, represent structures in action. But since they *depend* on structures, and since structures are determined in heredity, functions are also thus determined. The racehorse does not inherit his *speed*. Nor does he even directly inherit his *legs*. But his legs are hereditarily determined, and his speed is a function of those legs and their neuro-muscular equipment. His speed is therefore as genuinely determined as are his legs. At least his potential speed limit is thus determined. Neither does a child inherit his beauty, which is a function of his physiognomy. But both physiognomy and beauty are hereditarily determined.

These distinctions are here made because a certain extremist tendency among disappointed scientific workers has led to the dogmatic repudiation of heredity as a factor in mental equipment. Just because, as it is asserted, mental traits are not structures, it does not follow that they are not determined by ancestry. Even if the mech-

anism of development is chiefly concerned with laying down structures, it thus determines function also, or at least the limits of functional capacity. The only qualification required is that modes of activity are more susceptible to extrinsic influences than are facts of structure. We may expect therefore that many functional resemblances to ancestry (the best available index of hereditary determination) will be less exact than structural resemblances, because of the diversity of environmental pressures.

Perhaps the simplest way in which to view the data on heredity in the case of such traits as those in which discussion is likely to center, is by way of measures of resemblance between related and unrelated individuals. It is not necessary to consider parents and offspring only, since the fact of heredity is simply the fact that parent and offspring derive their trait determination from the same continuous streams of germ plasm, in part. Resemblance of parent and child will not be perfect, if for no other reason, because in the case of the child an additional line of germinal determination (represented by the germ plasm of the other parent) is brought into relation with that of the first parent.

Measures of resemblance may be derived by statistical methods in common use, which will range from 1.00, in the case of the closest resemblance, down to .00 in the case of resemblance that is entirely accidental. Thus the degree of resemblance between unrelated individuals may be considered to be .00, which will be only that degree of resemblance due to remote or racial ancestry, rather than to more immediate parentage. The following is a compilation of measures of resemblance (correlation)

secured by such investigators as Pearson, Thorndike, and other students of human heredity.[5]

TABLE III

CORRELATIONS AS INDICES OF HEREDITY RESEMBLANCE

Feature Measured	*Correlation*
Eye color, between brothers (Pearson)	.52
Height, between father and son (Pearson)	.30
Height, between brothers (Pearson)	.50
Cephalic index, between brothers (Pearson)	.49
Color of hair, between brothers (Pearson)	.55
Spelling ability, between brother and sister (Earle)	.50
Estimated morality, between parents and offspring (Woods)	.30
Teachers' estimates of personality traits of school children (siblings) (Pearson)	.50
Arithmetic ability, child and mid-parent (Cobb)	.49
Mental tests, between siblings (Thorndike)	.35
Mental tests, between twins (Thorndike)	.80
Mental tests, between siblings (Starch)	.40
Intelligence quotients of orphan siblings (Gordon)	.53
Intelligence quotients, between siblings (Madsen)	.63
Intelligence quotients, between siblings (Hart)	.45
School records, between cousins (Dexter)	.22
Ability in reading, between siblings (Starch)	.49
Penmanship, between brothers and sisters (Pearson)	.48

The interest of such a table of correlation figures lies in the fact that the measures of resemblance between related individuals are no smaller in the case of the activities, dexterities, and mental performances than they are in the case of such physical features as height, weight, eye

[5] A convenient summary may be found in Hildreth, "Resemblance of Siblings in Intelligence and Achievement," Teachers College Contributions to Education, No. 186 (1925).

color, hair color, and head measurements. Remembering that .00 resemblance would result, by the methods used, in the case of unrelated individuals paired at random and compared, it is clear that family membership, which means common hereditary determination, is a potent developmental factor.

There are numerous other studies of heredity as a factor in mental development, many of which do not yield such simple measures of resemblance. Studies of special afflictions and deprivations or disabilities, such as deafness, feeble-mindedness, insanity; of gifts and talents, as revealed through artistic abilities, literary and scientific eminence, and other forms of achievement; studies of orphans in common and in diverse environments; prolonged educational efforts to change the initial limits of intellectual performance and learning ability; comparison of the relatives of gifted children with those of children selected at random or on the basis of their average status; inquiry into the antecedents of delinquents and dependents; comparison of twins and other siblings; studies of infants with inferior ancestry, adopted into a superior environment at an early age; all combine to convince the most diligent students of the subject that heredity as a factor in psychological endowment and development is no less real than it is in the determination of structural pattern and morphology.

LIMITATIONS OF KNOWLEDGE

Such results do not, however, justify sweeping assertions of the omnipotence and omnipresence of hereditary determination, except so far as concerns developmental

limits. For one thing, the fact that such coefficients of resemblance are far from being perfect shows that each individual's heredity is very complex, and that inspection of close relatives is far from being an adequate index of the individual's make-up and possibilities. It may also mean that extrinsic factors play an important rôle which disguises the simple tendency of intrinsic determination.

Much remains to be learned concerning the relative influence of intrinsic and extrinsic factors in each particular aspect of human personality and mental endowment or achievement. Each feature or function must be investigated in its own circumstances, with the constant realization that the balance of influence surely varies considerably from trait to trait. Especially must it be borne in mind that opportunity and exercise, motivation and education, have much to do with the degree to which the momentary picture of mental make-up approximates such limits as heredity has imposed. But developmental psychology is no more interested in one mode of determination than it is in the other. In any given case it may be interesting to estimate the relative potency of nature and nurture, but, as we have already seen, both influences will inevitably be present. Even the human ovum does not develop according to its hereditary plan without the stimulation afforded by the entering spermatozoön. Neither do mental powers evolve except through reaction to stimuli.

SPECIAL LAWS OF HEREDITY

At present our estimates of the strength and influence of hereditary tendencies are most clear in the case of definite structural characteristics which can be easily

identified and measured, and which are relatively little affected by environmental factors in later life. In the case of such traits, and especially for lower animals and plants, it has been amply demonstrated that special mechanisms are involved in hereditary determination, that general formulas can be stated covering the trend of results, and that accurate prediction can be made even in the case of the offspring of particular matings. Some of the general principles refer chiefly to the statistical aspects of traits, when large groups are considered with respect to their average and distribution. Other principles refer more specifically to the physiological mechanisms of hereditary determination in particular instances. Although the application of these principles to mental features is still very tentative, the principles are of considerable interest to the student of development, since modern research is constantly seeking to apply them to the psychological traits of human beings.

Galton's "Law of Ancestral Inheritance." This law was originally formulated by Francis Galton[6] in the following words: "The two parents contribute between them on the average one-half or (0.5) of the total heritage of the offspring; the four grandparents, one-quarter, or $(0.5)^2$; the eight great-grandparents, one-eighth, or $(0.5)^3$, and so on. Thus the sum of the ancestral contributions is expressed by the series $[(0.5) + (0.5)^2 + (0.5)^3$, etc.], which, being equal to 1, accounts for the whole heritage."

Various other formulations have been given for the gen-

[6] Galton, "The Average Contribution of Each Several Ancestor to the Total Heritage of the Offspring," *Proceedings of the Royal Society*, LXI (1897), p. 402.

eral statistical facts represented by Galton in this law. Thus Pearson [7] determined the correlations between children and parents (about .50); and grandparents (about .33); and great-grandparents (about .22). The general fact to which the law calls attention is that the hereditary determination is very complex; many ancestors contribute; and the influence declines on the whole with remoteness of ancestry. It is not shown that there are traits to which the law applies in any detailed way in the constitution of a particular individual. And the applicability of the law even to group averages is probably invalid in the case of traits conforming, in their inheritance, to the laws of Mendel.

Galton's "Law of Regression." This law Galton [8] expressed in the following words: "If the word 'peculiarity' be used to signify the difference between the amount of any faculty possessed by a man, and the average of that possessed by the population at large, then the Law of Regression may be described as follows: Each peculiarity in a man is shared by his kinsmen, but *on the average* in a less degree. It is reduced to a definite fraction of its amount, quite independently of what its amount might be. The fraction differs in different orders of kinship, becoming smaller as they are more remote." This is sometimes described as a tendency toward mediocrity, a tendency to approximate to or to maintain the average of the race or stock.

Pearson [9] illustrates the law as follows:

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[7] Pearson, "The Law of Ancestral Heredity," *Biometrika*, II, Part 2 (1903), pp. 211-236.

[8] Galton, *Natural Inheritance*, p. 194, 1889.

[9] Pearson, *Grammar of Science*, p. 454, 1900.

Fathers of a given height have not sons all of a given height, but an array of sons of a mean height different from that of the father and nearer to the mean height of sons in general. Thus take fathers of stature 72 inches, the mean height of their sons is 70.8 inches, or we have a *regression* towards the mean of the general population. On the other hand, fathers with a mean height of 66 inches give a group of sons of mean height 68.3 inches, or they have *progressed* towards the mean of the general population of sons. The father with a great excess of that character contributes sons with an excess, but a less excess of it; the father with a great defect of the character contributes sons with a defect, but less defect of it. The general result is a sensible stability of type and variation from generation to generation.

It need not be supposed that there is any animistic urge toward the maintenance of "the type," nor even that "the type" is necessarily a more stable form or equilibrium, deviations from which are unlikely to persist. The inheritance of offspring is only in part immediately from the parents; earlier ancestors also contribute, and, if we go far enough back, the ancestry of a given individual comes to be the average of the stock from which he comes. The net outcome of these two sets of influence, the one toward the average, the other toward the deviation represented by immediate parentage, would produce *average results* which would fit the "law of filial regression." Again, this would be but an average result, holding true of group tendencies; it by no means follows that the offspring of exceptional parents are always less exceptional than they. But this would be more often the case than not, and this would justify a general bias of expectation.

These results, in the case of intelligence, as measured by standardized tests, are illustrated in the following case,

from the investigations of Hollingworth and Cobb.[10] A group of thirty-seven children, ten years old, all with intelligence quotients above 135 (ranging from about 135 to 185), and all of whom had brothers or sisters (siblings), were compared, in intelligence, with these brothers and sisters of whatever age. The results, in terms of intelligence quotient, are shown in the following graphs. The solid line shows the distribution, in percentages of the group, of the ten-year-old children with high intelligence. The dotted line shows the distribution of intelligence quotients for their thirty-four brothers and sisters. The bright ten-year-olds average 155 in intelligence quotient; their brothers and sisters average 129. That is, the siblings of these bright, exceptional children, of a given age, are also brighter than average, but not so exceptional in this respect as the selected children themselves. They *regress* about half way toward the normal 100 rating, in conformity with Galton's statement.

Furthermore these bright ten-year-olds may be divided into two groups, according to their degree of intelligence. In one group may be placed those falling below 150 in intelligence quotient (135 to 150). The average intelligence quotient of their siblings is 124. In the other group may be placed those falling above 150. The average intelligence of their siblings is 133. That is to say, the brothers and sisters of the *brighter* section of the exceptional group rate nine points higher than do the brothers and sisters of the less exceptional section. These evidences of the resemblance of kin are striking and objectively de-

[10] L. S. Hollingworth and Cobb, "The Regression of Siblings of Children Who Test at or above 135 I.Q. (Stanford-Binet)," *Journal of Educational Psychology*, January, 1925, pp. 1-7.

termined; but working with this tendency is that to resemble also the average.

The Law of "Alternative Inheritance." This is a term sometimes used to refer to that mode of inheritance which Mendel first reported in 1866, and which remained un-

FIG. 7.—REGRESSION OF SIBLINGS OF BRIGHT CHILDREN.

On the horizontal base are given the Intelligence Quotients. Along the vertical axis are indicated, for the various quotients, the percent of each group attaining those degrees of intelligence. A quotient of 100 indicates the average of the general population. The siblings of the bright children are seen to be superior to the average, but inferior to the bright children themselves, thus illustrating Galton's "Law of Regression." (From Hollingworth and Cobb.)

noticed until its rediscovery by several investigators in 1900. Since that time the study of "Mendelian inheritance" has advanced so rapidly that its results and formulations have become fairly complicated and extensive. The essential features of this mode of hereditary determination are three in number; these are not facts of direct observation, but hypotheses which, if assumed,

enable the explanation of the results of heredity for certain traits, and, in many cases, their prediction.

Unit Characters: These are hypothetical factors, comprising in part the inheritance of an individual, and determining the development of particular traits or features. They are indivisible and are inherited on the "all-or-none" principle.

Dominance: Some of these characters are contrasting and incompatible. If contrasting characters are received from the two parents, they do not "blend" in the offspring; instead one (the dominant) is likely to appear while the other (the recessive) does not appear in somatic development, but is nevertheless still represented in the germ cells.

Segregation: The germ cells of such offspring are supposed to be "pure" with respect to such contrasting determiners, although some will contain the dominant character, others the recessive factor.

Under the influence of these characteristics of germinal constitution various predictable types of inheritance result, which conform to the mathematical laws of chance and permutation. For the details of such inheritance the reader should consult volumes devoted solely to the problems of heredity and genetics.[11]

Mendelian inheritance has been demonstrated very clearly and precisely in the case of many structural traits of plants and animals. In the case of human beings these features have been chiefly the characteristics of hair, skin, and eyes, and various pathological conditions, such as

[11] See Conklin, *Heredity and Environment*, chaps. ii and iii, for a very clear and instructive account of the mechanism and modes of heredity.

anomalies of fingers and toes, certain diseases, and color blindness. The application of Mendelian inheritance to such human features as intelligence, temperament, talent, and to special forms of mental disorder has been attempted, with results that are not yet convincing. Advance in this field may wait upon the development of more adequate and precise methods of identifying and measuring mental traits.

CHAPTER VI

THE DIVERSITIES OF HUMAN NATURE

In spite of common lineage, human beings present an infinite diversity. However similar the members of a strange group may seem on short acquaintance, greater familiarity discloses such variabilities among them that we marvel at our ever having supposed them to be indistinguishable. Even such trivial features as the pattern of the minute skin ridges on the finger tips differ so distinctly from individual to individual that "finger prints" serve as one of the most unmistakable means of personal identification.

Psychological diversity is equally great. Individuals vary among themselves in every conceivable mental feature, and they vary over a wide range. In their earliest days they differ perceptibly in appearance, in behavior, in attitude, and in alertness. Their courses of subsequent development proceed at varying rates and in diverse patterns. Throughout their careers their individual repertoires of conduct, thought, and feeling will distinguish them. The limits to which upward or forward development brings them will be varied and distinctive, as will be also their rates and modes of involution and decline.

So common and so consistently found is this human diversity that it has been submitted to mathematical treat-

ment. The properties of the "normal frequency distribution" of mental and physical measurements have come to constitute a complicated statistical and mathematical basis for the science of psychometrics. Human variability is thus definitely related to other variable phenomena of nature.

The reasons for this human diversity are many. Some of them are so important for developmental psychology that they should be given definite indication and illustration. For the greatest difficulty in studies of development, aside from that of securing first hand and reliable observations, is that of making generalizations. Since no single individual is perfectly representative of others, generalizations concerning development are likely to expose as many exceptions as they do confirmations. Only a clear notion of the nature and the ultimate orderliness of human diversity suffices to qualify generalizations in the light of those facts.

INTRINSIC VARIABILITY

Since germ plasm is organic tissue, an aggregation of protoplasmic cells, it is intrinsically variable, as are all organic structures. The nature of this intrinsic variability we are far from understanding. It may well be that what is intrinsic is not variability at all, but only susceptibility to a multitude of influences of so minute and unpredictable a character that they are beyond our present knowledge and control. But this general fact, that life, which is a variable phenomenon, comes from preëxisting life, makes for diversity even among the products of the same organism, as for example among flowers on the same stalk, or leaves of the same tree.

This source of human diversity has been aptly and dramatically expressed by Thorndike in the following words:

> The qualities of the germs of a man are what we should know in order to prophesy directly the traits of his children. One quality these germs surely possess. They are variable. Discarding syntax and elegance for emphasis, we may say that the germs of a six-foot man include some six-foot germs, some six-foot-one germs, some six-foot-two, some five-foot-eleven, some five-foot ten, etc. Each human being gives to the future, not himself, but a variable group of germs. This hypothesis of the variability of the germs explains the fact that short parents may have tall sons, gifted parents stupid sons, the same parents unlike sons.

Galton, who found that the offspring of exceptional parents were more mediocre than those parents, supposed that there was a general variational tendency to revert from exceptional status toward the average of the species. This has been called a law of filial regression. That this is not an essential developmental law is however shown by the fact that *any group* of individuals, chosen at random, would be more mediocre than some particular individual chosen for his exceptional standing in the trait considered. Thus the people living on the same street with this exceptional individual would also average lower than he would. The mediocrity of the offspring of exceptional individuals is therefore not the sign of a tendency to "revert to type," but only a sign that the individual so chosen was actually exceptional. That his offspring were not completely mediocre but would be on the average somewhat superior to the type, is a sign of hereditary influence, that is, of a superior strain of germ plasm in the related group.

DIVERSITY THROUGH SEXUAL REPRODUCTION

A second, and a very important source of human diversity is to be found in the mode of human reproduction. Each new individual, since he is the joint product of two parents, represents the combination of two different streams of germinal organization. Even if these two strains merely mixed or combined in some algebraic fashion, considerable diversity would result. But the mechanism of heredity, with respect to many features at least, is much more complex than this. The complicated laws of Mendelian inheritance, as defined by genetecists, show that intricate relationships of dominance, recessiveness, combination, multiple determination, and the like are required to express the results of such sexual reproduction.

The importance of this source of diversity is illustrated vividly by Conklin's statement of the possibilities of permutation among contrasting characters in the parentage. Conklin [1] writes:

> The principles of Mendelian inheritance show that for every pair of contrasting characters in the two parents, as for example straight or curly hair, brown or blue eyes, there are two types of grandchildren showing these characters; when there are five such pairs of contrasting characters in the parents there may be $(2)^5$ or 32 types of grandchildren, showing various combinations of these five characters; when there are ten pairs of contrasting characters there may be $(2)^{10}$ or 1,024 types of grandchildren.

How final the present formulation of the laws of inheritance may be is a matter of great interest, but of no importance in the present connection. It is at least clear

[1] Conklin, *The Direction of Human Evolution*, p. 31.

that the mechanism of heredity is very complex, and that one of the results of sexual reproduction is the great diversity of types and patterns of organization represented in the new individuals. There is no reason to believe that this mechanism is less instrumental in the production of psychological diversity than it is in the case of physical characteristics.

ACQUIRED MODIFICATIONS

It need scarcely be added that many of the diversities presented by human nature are not original but acquired through experience, training and exercise, or accident. The languages we speak, the foods we prefer, the clothes we wear, the particular objects we fear, the goods we set our hearts upon, the customs we revere, the desires we submerge, the aspirations we freely express, the games we play, are largely matters determined by historical or geographical circumstances. Every occupation of industry and leisure leaves some impress on our general make-up, just as the varied accidents of life produce on us diverse disfigurements. Here the operation of extrinsic factors in the manufacture of human diversity is apparent. How profoundly and extensively such episodes may affect our personality is one of the interesting developmental problems. Equally interesting are those constitutional idiosyncrasies which make us differentially sensitive to such sources of modification.

DIVERSITY AS RELATED TO AGE AND SEX

Many unsupported superstitions have been advanced concerning the variation of human diversity with age.

School practices have sometimes, for example, been planned on the assumption that at adolescence human diversity increases through some intrinsic law of growth. Thus Hall writes that during this period "individual differences of all kinds are now suddenly augmented." "The range of individual differences and average errors in all physical measurements and all psychic tests increases." "The possibility of variation in the soul is now at its height."

Careful examination, by Henmon [2] and Livingstone, of the extensive array of published measurements on children of different ages fails to confirm these interesting declarations. Except for height and weight, variability as shown by the groups measured, does not increase at any period. Instead it gradually diminishes, if by variability is meant the percentage of the measure of dispersion to the measure of central tendency. That this apparent decrease is due to factors of selection operating in the choice of different groups of children at later and later ages, is quite possible. But the data at least fail to disclose either increasing diversity with age, or peculiar diversity at any particular ages, in those traits which represent the fairly fixed ability of the individual in the performance of tasks and the solution of problems. A study, by the present writer,[3] of groups of men ranging from eighteen to forty-five years of age, failed to show any change in variability within the various age levels considered.

Individual differences in rate of development would tend on the whole to produce increasing range of dif-

[2] Henmon, "Comparative Variability at Different Ages," *Journal of Educational Psychology*, January, 1922.

[3] H. L. Hollingworth, *Psychology of Functional Neuroses.*

ferences as age advances, up to the point of maturity. It is perhaps such differences in rate of growth that give the increase in diversity which the data show in the case of the physical measures of height and weight.

In the case of the noncognitive features, the interests, the attitudes, the feelings and emotions, the values, preferences and inclinations, measurements of diversity as correlated with age are not available. There is some reason to suppose that since it is these features which are more susceptible to extrinsic influences, whether their diversity changes or remains fixed will depend chiefly on whether, as the result of life career, the environments of different individuals become more heterogeneous or not. Such a situation might readily vary both with time and place, and hence scarcely enable the formulation of any developmental law.

In the case of sex, the old controversy over the relative variability of males and females seems to have abated as more abundant data have been accumulated.[4] Whatever differences in diversity may appear in experimental groups, classified on the basis of sex, arise, it is now clear, not from any special or peculiar sex determination, but upon features of social pressure, education, and environmental opportunity and encouragement.

DIVERSITY, DEFICIENCY, AND TALENT

Although there are several difficulties involved in the attempt to give mathematical expression to amounts of relative variability in different traits, it is clear that

[4] L. S. Hollingworth, "Variability as Related to Sex Differences in Achievement," *American Journal of Sociology*, January, 1914.

human beings display greater diversity in some respects than they do in others. The tallest living man is scarcely more than two or three times as tall as the shortest adult. But, by any method of estimation, the most intellectual human being is many times more intelligent than is the stupidest idiot. That is to say, it would be generally agreed that human beings are more diversified in intelligence than they are in height. Again, we differ scarcely at all in the *number* of fingers with which we are born, but we differ appreciably in the *length* of those fingers, and still more in their *nimbleness* and *strength*.

In what follows we shall express the amount of diversity by dividing its absolute amount by the average from which the separate measures diverge. The measure of variability will thus be the per cent which the variation is of the average from which it is computed. This may be illustrated simply, to make sure that the statements which follow will not be misunderstood.

Suppose that we have seven objects, weighing respectively 7, 8, 9, 10, 11, 12, and 13 pounds. Their average weight is 10 pounds. The respective deviations of these several weights from the average are 3, 2, 1, 0, 1, 2, and 3 pounds. The average of these variations or diversities is 1.7 pounds. And this average diversity is 17 per cent of 10 pounds. We may write this measure for convenience .17. This is known as the Pearson coefficient of variability.

If now, without discussing the possible impropriety of adopting this coefficient for every possible situation,[5] we simply arrange various features in which college men

[5] Thorndike, "Empirical Studies in the Theory of Measurement," Archives of Psychology, No. 3 (1907).

have been measured in a rank order, according to the coefficient of variability which each trait shows, when the same men are measured in all the traits, we get, from Wissler's[6] data, the following tabulation. Alongside these data is placed a similarly arranged set of measures of various traits on a group of college girls, reported by Carothers.[7] In each case the coefficient of variability increases as one goes down the column. This means that the group becomes more and more diverse in these traits.

TABLE IV

College Men (*Wissler*)		College Women (*Carothers*)	
Trait	Variability	Trait	Variability
Length of head	.022	Digit span	.066
Memory span	.058	Tapping rate	.074
Time of movement	.114	Target hitting	.090
Auditory reaction time	.120	Speed of naming colors	.093
Strength of grip	.136	Word recall memory	.095
Speed of naming colors	.167	Substitution learning	.115
Weight perception	.359	Naming opposites	.117
Index of fatigue	.410	Logical recognition	.138
Estimating time	.470	Mixed relations analogies	.151
Retrospective memory	.577	Word building ingenuity	.161
Finding remembered tone	.650	Following directions	.220

The names of these tests or measurements will indicate their nature with sufficient accuracy for our present purpose. Those who are familiar with laboratory measurements will recognize in them for the most part well-known standard performances or types of accomplishment. Nor

[6] Wissler, *The Correlation of Mental and Physical Tests*, 1901.

[7] Carothers, "Psychological Examinations of College Students," Archives of Psychology, Columbia University, 1921.

are we concerned with any comparison of the two sets of measures. Instead our interest is in the fact that these performances may be arranged in a hierarchy according to the diversity displayed in them by a given group of adults, chosen at random, so far as the present purpose is concerned.

Such a hierarchy of variability can be made of any group of measures made on the same group of individuals. People differ more from one another (as measured by the Pearson coefficient of variability) in some activities than they do in others. Furthermore, certain general principles may be given, which express the ways in which these diversities differ. The following constitute a tentative and suggestive set of such principles. Their correctness may be examined by applying them to such tables of data as those we have here presented. Although the distinctions are in some cases not sharp, and although several of the principles may be seen to overlap or to contain features which would be contradictory when applied to a given type of activity, they are of sufficient validity and usefulness to be of great interest to developmental psychology. The principles are as follows:

SUGGESTIVE PRINCIPLES OF HUMAN DIVERSITY

1. Complex traits are more variable than are simple ones. The more complex the activity, the greater will be the human diversity in its performance.
2. Functional traits are more variable than are structural ones. The more functional the trait the greater will be the diversity of human beings with respect to it.

3. Recently acquired traits (both in the individual and in the race) are more variable than ancient or long established ones.
4. The less widespread the trait, the more variable will individuals be in respect to it. Specific traits are more variable than generic traits.
5. Infrequently used traits are more variable than are traits or activities more constantly employed.
6. Unimportant traits are more variable than essential ones. The variability of a trait increases with its biological irrelevance.
7. Increasing variability attends the introduction of symbolism into the activity. Symbolic activities are more variable than are directly perceptual ones.
8. Traits (if any) determined by the cytoplasm of the ovum are less variable than traits determined jointly by the nuclei of sperm and ovum. "Maternal inheritance" is less variable than "joint inheritance."

The following illustrations will show what is meant by these principles, although these single examples are of course far from adequate proof of their generality. Individuals differ more in ability to divide than in ability to add, the former being more complex. They differ more in speed than they do in size, the former being more functional. They differ more in processes involving the neo-pallium (new brain) than in those depending on the archi-pallium (old brain). They differ more in skin color than in the character of their teeth. The latter is a more generic trait, for that very reason, indeed. They

will differ more in running than in walking, the latter being more commonly engaged in. They will differ more in color vision than in brightness vision. The former is perhaps not only less important, but also more recent in acquisition and perhaps more complex. They will differ more in their understanding of the meaning of words than in their ability to discriminate them as mere objects, or in the distance at which they can distinguish them. The former involves a high degree of symbolism. Finally the number of fingers and the general symmetry of the bodily structure will be less variable than the size or strength of the respective parts. Perhaps the former are more directly determined by the cytoplasm of the ovum.

THE DEFICIT OF THE FEEBLE-MINDED

These principles, however tentatively formulated, carry us still further into developmental psychology, for it appears that features in which human nature is more diversified are also more unstable in the individual. In them development is more likely to be exceptional, in the individual. Although the principles are derived from the measurement of ordinary or normal groups, they nevertheless show us what to expect in the case of various forms of deficiency and talent, in the case of individuals who were not members of the original group.

We may illustrate this result in the case of mental deficiency and gifted intelligence. Those who are mentally defective are not equally defective in all respects. But they will tend to be somewhat defective in all their characteristics. Measurement of a mental defective will disclose the relative amounts of his backwardness or sub-

normality in different traits or features. In fact our principles of human diversity enable us to know beforehand what the array of deficits is likely to be. For mental defectives will be most defective in just those traits in which a normal group is most variable. According to the position of the trait on the hierarchy of general normal human diversity, the deficit of the mental defective in it will be either small or great. The following examples will illustrate this very important principle of inadequate development.

TABLE V

DIVERSITY AND DEFICIT

(*Data from Tirrapegui, showing variability of normal boys, and relative backwardness of feeble-minded boys, of same age and race, in the same characteristics.*)

Trait Measured	Variability of Normal Boys	Per Cent Deficit of Feeble-minded Boys
Circumference of Head	.19	.020
Sitting Height	.32	.028
Head Width	.41	.033
Length of Palate	.49	.037
Arm Span	.52	.049
Grip, Right Hand	.71	.109
Weight	.81	.125
Lung Capacity	5.92	.235

In this table the array of traits is arranged according to the hierarchy of diversity shown by normal boys. This coefficient of diversity is shown for each trait, in the second column. In the third column is shown the amount of relative inferiority which the group of feeble-minded boys showed in each trait. It is to be observed that the hierarchy of deficit accords perfectly with the hierarchy

of normal variability. Backward boys will be found to be most backward in those features in which normal boys are most variable. These data relate only to physical measurements.

Perfectly comparable data for the comparison of diversity and deficiency in the case of psychological traits are not at present available. But the following set of results, from an early set of measurements by Norsworthy [8] shows the general conformity of these traits to the same rule. The figures for normal variability are unfortunately taken from different sources, in the case of various traits, so that the comparison is not quite so valid as in the foregoing case. The figures for the defective show the per cent of the mental defectives who reach or exceed the median of normals for their age. The smaller this figure the greater the deficit. For the figure to be .50 would mean that the two groups coincided, the feeble-minded showing no deficit.

The traits are arranged in the following Table VI according to the degree of feeble-minded deficit, the deficit increasing as one goes down the column. It will be observed that, in spite of the varied sources of the figures for variability, there is in general the same tendency for them to increase in the lower part of the column. If we average the variabilities of those three groups of traits in which the deficient are least, moderately, and most deficient (the first three, the next four, and the last three traits) these measures of diversity are .10, .14, and .16 respectively. The degree of deficit varies directly with the ordinary diversity of the trait.

[8] Norsworthy, "Psychology of Mentally Deficient Children," Archives of Psychology, Columbia University, No. 1.

TABLE VI

COMPARISONS FROM NORSWORTHY—DIVERSITY AND DEFICIT

Trait Measured	Normal Variability	Per Cent of Defectives Who Attain Normal Median
Pulse Rate	.090	.49
Height	.030	.45
Weight	.103	.44
Weight Discrimination	.271	.18
Genus-Species Test	.076	.09
Crossing Out A's	.106	.09
Part-Whole Test	.138	.09
Memory, Unrelated Words	.141	.06
Memory, Related Words	.110	.05
Naming Opposites	.244	.00

TABLE VII

RELATIVE EXCESS IN THE INTELLECTUALLY GIFTED

(*Data from Leta S. Hollingworth*)

Trait Measured	Normal Median for Given Age, Sex and Race	Gifted Median for Same Age, Sex and Race	Per Cent Excess of Gifted Over Normal Status
Sensory musical capacity	50 percentile	50 percentile	0.0
Circumference of head	52.63 cm.	55.34 cm.	1.7
Standing height	51 in.	53 in.	4.0
Strength of grip	23.4 kg.	25.0 kg.	6.8
Foot-pounds jump	399	426	6.8
Weight	64 lbs.	74 lbs.	15.6
Thorndike-McCall reading (understanding paragraphs)	33.8	48.5	43.4
Intelligence quotient (Stanford-Binet)	100	150	50.0
Arithmetic computation	57	100	76.0
Spelling at dictation	56	155	176.0
Arithmetic reasoning	30	85	184.0
Word meaning (vocabulary)	18	57	213.0

THE EXCESS OF THE GIFTED

It now remains to indicate the relation between ordinary human diversity and the characteristics of the gifted. If a group of individuals is chosen on the basis of their superior general mental ability or intelligence, the degree to which they excel the normal for their age may be determined in any trait. This will yield a measure of excess, comparable to the measure of deficit in the case of the feeble-minded. When such measures are secured it will be found that the gifted show greater excess in just those traits in which a normal group of their fellows shows greater diversity. The foregoing comparisons of the measures of a group of fifty children whose intelligence quotients range from 135 to 180, averaging 150, will illustrate this result. These measurements are compared with measurements of individuals of the same race, age, and sex, and whose intelligence quotients average 100. The data are from the investigations of L. S. Hollingworth.

The figures and traits are arranged in the order of increasing excess. The superiority of the gifted group increases from trait to trait as one goes down the column. In this case no actual measures of normal variability are given. Instead it will be more interesting to apply the "canons of diversity" previously formulated, in order to see if they do not apply to the arrangement of the hierarchy of gifted excess. The lower traits in the column are without question those that are most complex, most functional, most involved in symbolism, later acquired, and so on. The degree of excess varies directly with the ordinary diversity of the trait.

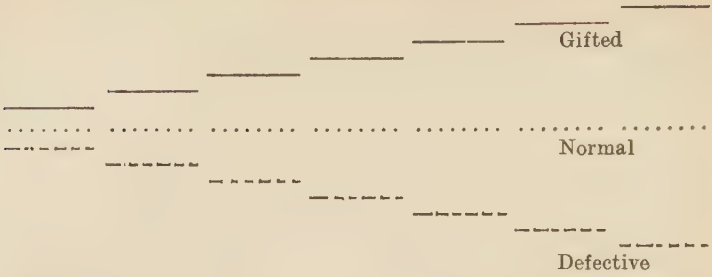

FIG. 8.—TYPICAL PROFILES OF GIFTED, NORMAL, AND DEFICIENT.

The general results of this discussion of diversity, in its relation to human deficiency and giftedness or talent, may be conveniently summarized in the above diagram. Here are represented the terms suggestive of the laws of diversity, and in the graph are shown the ways in which the feeble-minded will exhibit their deficit and the intellectually gifted will exhibit their relative degrees of superiority. The developmental significance of these facts is very great; they lay the foundation for developmental prediction.

CHAPTER VII

PRENATAL DEVELOPMENT

THE FŒTAL PERIOD

The period of embryonic development, between the moment of the fertilization of the ovum and the moment of birth, is in many respects the most remarkable stage of human development. During this period the individual grows from a single-celled structure to that elaborate organism represented by the "neonate" or newborn child. The account of the way in which, during this nine-month period, the individual development (ontogeny) telescopes and recapitulates in its configuration the various evolutionary steps (phylogeny) is one of the most absorbing stories of science.[1] Psychological development, as we are able to describe it, is however almost entirely confined to the postnatal periods.

That the structures which, when activated, will be the foundation of mental life, have undergone the greater part of their morphological development by the time of birth is shown by the sensory and motor equipment at that time, and by the elaborate growth of the brain mass. The various physiological functions are in effective operation at birth. Since sensory capacity is well developed by that time, and many motor activities are capable of

[1] Useful collateral references: Conklin, *Heredity and Environment;* Lull, *et al., The Evolution of Man.*

activation, we must suppose that the rudiments of mental activity develop in a manner which parallels anatomical growth. Of the play of intrinsic and extrinsic factors during this period we know little. The most that we can do at present is to call attention to certain possibilities of determination, aside from the intrinsic ones, which may during the prenatal period have some influence on the individual's psychological destiny.

NERVOUS STRUCTURE AND ORGANIZATION

When psychological development occurs, it represents or involves the activity of the nervous system especially, as the great connecting system of receptors and effectors. Nervous structure and organization proceed at a rapid rate during the prenatal period. This period is sometimes divided into three stages: the ovum stage (first two weeks), the embryo stage (next three weeks), and the fœtal stage (thereafter). The beginning of the formation and growth of nervous structures is to be observed as early as the ovum stage.

Thereafter nervous development proceeds at a rapid pace, through an involved course, and attains an advanced stage by the day of birth. In the second month the nervous elements or neurones appear in the form of neuroblasts or cells without the typical nervous extensions. A month later these cells have begun to extend themselves in the form of filaments and short threadlike prolongations. These extensions become the axons and dendrites of the nervous structure, reaching out to connect all parts of the organism into an elaborate system of communication and conduction. By the mid-point of intra-uterine

development the complete number of neurones to be possessed by the mature individual is supposed to have been produced, although many of them are still immature.

The maturing of the nervous system consists in various changes, among which are increase in size of the elements; their approximation, through the extension of the axons and dendrites; modifications of their points of communication, the synapses; acquisition of the myelin sheath or covering. These changes not only permit functional activity on the part of the individual neurones, but also result in the laying down of paths of ready conduction and patterns and systems of organization of these paths.

Some of these patterns and systems are perfected by the time of birth, some much earlier. Some delay until the early days of postnatal life. Some seem to be the result of intrinsic determination, others to depend on more or less overt forms of external stimulation and exercise. Earliest to mature are the neurones and neurone systems involved in vegetative control and in the more fundamental reflexes. Those of the old brain and midbrain develop next, and last to undergo the various changes involved in maturation are the various regions of the new brain or cerebral cortex.

MATERNAL METABOLISM

Adequate psychological life depends upon adequate structural integrity. It is in many ways conditioned by physiological stability and adjustment on the biochemical level. As we shall see at a later point, a simple organic inferiority may be the basis for complicated mental twists and unsuitable emotional adjustments. And the possible

bearing of glandular activity upon psychological reaction type should not be overlooked. But aside from the accounts of the embryology of structure, which it is not our purpose to dwell upon, only vague generalities can be suggested in this connection.

The embryo is commonly described as a parasite, grafted upon the uterus of the maternal parent. Surrounded by enveloping membranes which are formed by it, it is attached to the uterine wall by means of the placental tissues. Through this tissue it absorbs, from the maternal circulation, such substances as are required for its nourishment. Neither circulatory system nor nervous system is in direct communication or connection with the corresponding maternal systems. But by complicated selective processes of absorption there is set up an elaborate interchange of materials. Oxygen and food pass from the maternal system into the fœtus. Various waste products pass in the opposite direction from the developing embryo.

This mode of exchange is such that various harmful substances may also reach the embryo, after having been taken into the maternal system. Various gases, ether and chloroform as well as other drugs, occasional bacteria and toxins, are shown to pass from mother to child through the mechanism of placental absorption. It is therefore apparent that metabolic disturbance in the mother may in very direct ways affect the development of the embryo through interference with its own metabolic activity. Further details in this field do not however lie within the realm of psychology.

MATERNAL IMPRESSIONS

There is a widespread and lingering superstition, not easily displaced, that the psychic impressions of the mother, the sights and sounds experienced, the things read or thought about, the emotional states incurred, may directly influence the traits of the developing embryo. These superstitions do not relate to such indirect effects as might result from disturbed metabolism due to prolonged emotional stress. Instead they suppose some mode of imitative magic, whereby a duplicate of the maternal experience is impressed upon the structure or personality of the child.

Thus one mother occupied herself with serious reading during the period of gestation, in order to counterbalance the effect, upon the child's personality, of the mother's lifelong absorption in music and the lighter arts. Her excuse was that she desired "to give her child a well-balanced heredity!" Another woman desired a child in her later years, because such a child "would be surely more brilliant on account of the great amount of mental work I have done since the first child was born!" Another was certain that a birthmark borne by her child was due to her having gone fishing and held a fish in her hand shortly before the child's birth! And a parent whose child suffered from choreic movements of the head brought suit for damages against the local baker. The baker's horse, attached to his delivery wagon, kept bobbing its head up and down. The expectant mother had observed this horse from the window at which she sat, and this was offered as the explanation of the child's choreic affliction!

Tales of this sort come down to us from the days of primitive and imitative magic. Perhaps the reluctance with which many people abandon them is in part explained by the fact that the Bible offers such an account. Laban agreed, it is there narrated, to give his son-in-law Jacob, for his wages, such striped and speckled cattle as should accumulate during his absence on a journey.

> And Jacob took him rods of green poplar, and of the hazel and chestnut trees; and peeled white streaks in them, and made the white appear which was in the rods.
>
> And he set the rods which he had peeled before the flocks in the gutters in the watering troughs when the flocks came to drink, that they should conceive when they came to drink.
>
> And the flocks conceived before the rods, and brought forth cattle ring-streaked, speckled and spotted. And it came to pass that whenever the stronger cattle did conceive, that Jacob laid the rods before the eyes of the cattle in the gutters, that they might conceive among the rods.
>
> But when the cattle were feeble, he put them not in: so the feebler were Laban's and the stronger Jacob's. And the man increased exceedingly, and had much cattle, and maidservants and menservants and camels and asses.

Now even if the presence of such a story in the Bible be taken as a sign of its truthfulness, this does not commit one to the superstitious mode of explanation. It does not follow that Jacob prospered because of the magical use of maternal impressions. A recent number of the *Eugenics Bulletin* reports that "spottedness" in cattle and other animals is a *dominant* trait, pure color being a *recessive* characteristic. Jacob's prosperity therefore may be supposed to have resulted from his father-in-law's ignorance of the laws of Mendelian inheritance.

"Biologists agree that there is no foundation for the

more or less general belief that maternal impressions are responsible for malformations of the child. It can be understood, however, that a general disturbance of the fundamental metabolic processes in the mother may result in similar disturbances in the fœtus and thus may interfere with the normal developmental process." (Ferris.)

"Careful studies have shown that supposed 'maternal impressions' of the physical, mental or emotional conditions of the mother upon the unborn child have no existence in fact, except in so far as the quality of the mother's blood may be changed and affect the child. At no time, whether before or after birth, is the mother more than nurse to the child. Hereditary influences are transmitted only through the egg cell and the sperm cell and these influences are not affected by intra-uterine development." (Conklin.)

BIRTH ORDER AND PSYCHOLOGICAL DESTINY

The law of primogeniture, which favors the first-born in accession to property, title, and authority, is an ancient institution. Was this practise based upon the inherent superiority of first-born children; or upon economic and military preparedness; upon the fact that children earlier born were older and stronger upon the death of the parent and therefore better able to usurp the parent's place; or perhaps only upon some forgotten and nonrational basis? The answer to such questions we shall probably never learn. But the possible bearing of order of birth upon mental make-up and thereby upon destiny has been the subject of many investigations.

These investigations [2] have usually been of the statistical variety which makes it possible that correlations may be established which have no causal significance. Numerous incidental factors which are often not taken into adequate account in the interpretations of the statistical data make the problem much more complex than many inquirers have realized. Such factors should be included not in the *laws* but in the *accidents* of development. By considering the results of some of these investigations we hope not to fix superstitions more firmly in mind, but only to emphasize the various complications and to show what various influences have been suggested in connection with birth order.

Pearson studied the height and weight at birth of two thousand children, distributed according to birth order, and concluded that first-born children are apt to be both lighter and shorter at birth than are those later born. The data are given in the following table:

TABLE VIII

DATA FROM PEARSON'S STUDY

ORDER OF BIRTH	HEIGHT IN INCHES		WEIGHT IN POUNDS	
	Boys	Girls	Boys	Girls
First	20.62	20.27	7.01	6.76
Second	20.82	20.33	7.36	7.08
Third and Fourth	20.80	20.51	7.41	7.33
Fifth and Sixth	20.95	20.43	7.70	7.36
Seventh and Eighth ..	20.98	20.36	7.91	7.32
Ninth and Tenth	20.99	20.41	7.59	7.65
Eleventh and Later ...	21.14	20.73	7.92	7.88

[2] A useful summary, with bibliography, is to be found in chap. xiii of Holmes, *The Trend of the Race*, 1921.

Other tables of similar data tend to confirm these results. In connection with them several things are to be borne in mind. In the first place no accurate data have been found which show precisely how weight and height at birth are correlated with those features in later life. We should to be sure expect to find a positive correlation, but this we cannot positively assert. If the data are accepted, the explanation is no doubt to be found in such facts as the greater youth and smaller size of mothers at the time of the first child, and perhaps also their lesser adaptation to the physical demands of childbearing at the time of the first birth. These might be expected to influence the size of offspring.

Ansell and others find the infant death rate to be greater among the first-born. Ansell gives data from nearly fifty thousand births to parents in the professional and upper classes, as shown in the following table, taken from Holmes's *The Trend of the Race.*

TABLE IX

Order of Birth	Stillborn per 1,000 Born Alive	Deaths in First Year Per 1,000 Born Alive
First	40	82.2
Second	20	70
Third	15.5	69
Fourth—Sixth	17.4	78.3
Seventh and Over	20.9	97.4

By way of explaining these results we may add, in addition to the greater youthfulness and inferior adaptation of mothers, the probable greater ignorance and inexperience of parents at the time of the earlier birth, their probable economic insecurity and resulting inferior

medical and nursing care, and perhaps poorer quarters and nutrition.

Concerning the death rate in later life, and such factors as susceptibility to various forms of disease, statistics are numerous, but statisticians are far from agreed as to the reliability of the evidence. So many complicating factors intrude themselves into our present sources of information that the whole question is still unsettled. From our point of view the intellectual fate of the individual is more important, and, if data were available, the emotional influences depending upon status in the family. On these points, too, information at present, although very suggestive, is far from final. Typical results will be presented in a tentative form.

Greater eminence in fields of intellectual activity has been frequently reported as characteristic of the first-born. Thus Gini in Italy, Galton and Ellis in England, and Cattell and Yoder in America agree in finding that genius and distinction, as shown by reputation, fall by more than chance proportion to the earlier born of a family. The data deal almost exclusively with males. It has been generally recognized that incidental factors may easily be responsible for such results. Thus the custom of primogeniture gives advantages to the first-born and heir, which his brothers and sisters lack. The desires of parents may also become easily fixated upon their first-born, since for a time he is their *only* one, and since at any rate it will probably be the first-born who *earliest* sheds either honor or dishonor upon the family. Numerous statistical fallacies also complicate the interpretation of the data.

More striking results have come from the measure-

ment of intelligence in early years. Thus Terman [3] surveyed all the bright children in a large population, in the third to eighth school grades. Those were selected for study whose intelligence quotient, by test, was over 140. Data on birth order were secured for 574 cases of this degree of brightness. The data are said not to be reliable in the case of large families since the first-born in such cases would be too old to be found in these school grades. This would tend to favor the later birth orders in such families. Data from families of two, three, and four children, however, Terman judges not to have been influenced by selection. The table below gives Terman's results, and also (in parentheses) the figures from Cattell's study of American Men of Science and their birth order.

TABLE X

DATA OF TERMAN AND CATTELL, TAKEN FROM THE ACCOUNT GIVEN BY TERMAN

SIZE OF FAMILY	ORDER OF BIRTH			
	First	Second	Third	Fourth
2.....	56.1 % (57.4)	43.9 % (42.6)	....	....
3.....	36.9 (44.0)	31.9 (31.2)	31.2 % (24.8)	....
4.....	33.0 (36.1)	26.8 (22.4)	15.4 (21.8)	24.7% (19.7)

Chance distribution would give an equal number or percentage for each birth order. Instead, there is, both for the distribution of bright children and for the men of

[3] Terman, *Genetic Studies of Genius*, 1925. (Copyright 1923 by the Stanford University Press. Quoted by permission.)

science, a piling up in the earlier orders. This suggests that the explanations often given for the findings of Galton, Cattell, and others that first-born are superior are not so important as might seem. These explanations have been to the effect that special incentive, emphasis, and educational opportunity have favored the first-born.

From what we know of the intelligence quotient it is unlikely that it would be so markedly affected by these factors, or that such influences would appear in intelligence measurements at these early years. Terman hazards no explanation of the greater incidence of high intelligence quotients among the first-born. The results are true both for his group of boys and for the group of girls, taken separately.

The age of parents at the time of conception has often been asserted to have a definite developmental influence on the offspring. But the data are contradictory and the facts very complex. The once confidently made assertion that Mongolian idiocy is more characteristic of the last born, suggesting reproductive exhaustion, is also now often denied. Many results attributed to youthful parentage apparently come from the earlier marriage or reproduction of the feeble-minded and the less competent.

It seems to be true that, after eliminating the difficulties due to first birth, there is greater infant mortality with greater maternal age. This, if true, is not a contradiction of the earlier statement that mortality is less with later children of the same mother, but it is only a statement that childbearing in later years appears to be more difficult.

Many inadequacies and faulty personal qualities attributed to children of older parents, or to children of

younger parents, and so on, are probably determined by the fact that such children tend to come from very large families. In recent years the larger families have tended to come more often from inferior human stocks, and the data would be weighted unduly from such sources. Questions concerning the effect of being an only child will be considered at some length at a later point in this book.

CONSANGUINEOUS MATING AND RACIAL CROSSING

Exogamy is a very common and a very primitive institution. It seems however to have originated without reference to the possible effects on progeny, and we may leave to the anthropologists the problem of explaining its rise. Although many instances of a given kind may be selected to illustrate the general danger of the mating of close relatives (consanguineous mating), the best evidence suggests that only when the stock contains undesirable (perhaps recessive) traits does inbreeding result in disaster.

Studies of animal breeding give varied and sometimes complex results, but they tend on the whole to confirm this conclusion. Inbreeding does undeniably tend to perpetuate definite undesirable traits, such as feeble-mindedness, insanity, blindness, deafness, and perhaps various other characteristics.[4]

But for the same reasons, inbreeding may, in proper stock, be productive of desirable results and perpetuate desirable traits. The mechanism of heredity does not pause to consider the human desirability of a product

[4] Useful summary and bibliography in Holmes, *The Trend of the Race*, chap. xi.

before it acts. The familiar reference in this connection is to the family of Charles Darwin, who married his cousin; all of their sons became distinguished for their ability and superior achievements.

The effect of racial crossing upon the quality of offspring is still debated. Opinions are contradictory and are often actuated by prejudice or enthusiasm. So far as human beings are concerned we do not know whether such crossing has any definite effect or if so, what its nature or conditions may be. Many apparent results of such mating are probably produced by selective factors and by social or psychological improvement or demoralization. The question must be left for biological evidence yet to be accumulated.

THE DETERMINATION OF SEX, AND SEX RATIOS

Of considerable importance for the developmental history of the individual is the accident, if such it be, of sex. Whatever may be concluded as to the original psychological characteristics of the sexes, it will probably always be true that their respective social heredities will differ considerably.

Primarily sex determination seems to depend on the characteristics of the spermatozoön and the ovum. In some lower species male and female eggs occur. In such cases the eggs develop by parthenogenesis, and no influence of sperm cells is required. In others however the situation is quite different. According to Morgan, Wilson, and others, the male cell plays an important part in sex determination, in the cases studied. These have all been lower forms of life than man, so far as the observed course of events is concerned.

It is said that there are two types of sperm cells in man, those with twenty-three and those with twenty-four chromosomes (minute structures to be observed in the cell nucleus). When the ovum is fertilized by the former a male develops; in the case of fertilization by the latter a female is produced.

But these immediate factors are for us of less significance than the remoter factors or circumstances which may have a part in determining which form of spermatozoon will become effective. Are there any factors which predispose toward maleness or femaleness of offspring? [5]

Statistics from all parts of the world agree in showing a general excess of male births, in a ratio of about 106 to 100. In abortions and premature labors the males are also in excess. Evidently the chances of being a boy are some 6 per cent greater than those of being a girl. Now are there any circumstances that modify this ratio, making the chances either greater or less? And what factors are responsible for this ratio?

One explanation offered for the excess of males is that the spermatozoon with the lesser number of chromosomes is perhaps for that reason somewhat lighter, hence somewhat swifter in movement, and therefore more likely to reach the ovum in time to be its fertilizing stimulus. Whether this is only a fantastic speculation, or not, further investigation will inform us.

Most savage tribes are reported to have developed formulas calculated to produce more boys, and such formulas for sex determination have had an interesting history, however naïve. From the time of Hippocrates, at

[5] A useful reference is chap. xiii on "Heredity and Sex," in *Heredity*, by Thompson, 1913.

least, until the present day, the problem of sex determination has engaged many investigators and provoked a long array of statistical, experimental, and mythological data. Kisch [6] gives a forty-page summary of these speculations, conclusions, and practises. He concludes from a comparative study of the evidence known to him that something like the following generalizations seem justified. Their quotation here does not commit the present author to their acceptance.

Kisch concludes that:

Several factors are involved in a complex fashion, and not in the ovum alone nor the spermatozoon alone, but in their combined effects at the time of conception.

It seems established that if the father is at least ten years older than the mother and the latter is in the period of her greatest reproductive capacity (20 to 30 years of age), more boys than girls result (in the ratio of about 116 to 100).

Further, the parent that is sexually more vigorous seems to constitute an influence toward offspring of the same sex.

Conception occurring late after the menstrual period (at least 8 days) favors male offspring.

The evidence is somewhat less conclusive that undernourishment of the mother also favors male offspring.

Certainly none of these factors is absolute, and the most that any of them have been held to do is somewhat to increase or change the proportion. The figures cited vary from table to table and the statistics involve numerous sources of error and possible fallacy.

Predominance of males in general has sometimes been attributed to the general tendency of men to mate with wives younger than themselves, and reports of increase in the proportion of males in times of war, famine, and

[6] Kisch, *Das Geschlechtsleben des Weibes*, 1907.

the like have been explained by the undernourishment of mothers in such circumstances. But the tentative conclusions of Kisch seem the very utmost that present knowledge suggests concerning the possible influences that are effective. And it is not at all clear what relation these have to the number of chromosomes in the sperm cell, which modern biologists assert to be the immediate causal factor. The only fact that can with great confidence be asserted is that an individual has some six or seven more chances in a hundred of being born a boy than of being born a girl. This is not a peculiarity of human beings. Reports of the sex ratios in the births of wild and domesticated animals lower than man also show an excess of males.

CHAPTER VIII

THE HUMAN BEING AT BIRTH

SOURCES OF INFORMATION

It might be supposed that our information concerning this period of development would be more complete than that relating to any of the other periods. At this stage every human being is helpless and requires the constant observation and care of others. As a matter of fact our knowledge of the actual capacities at birth and the traits of early infancy is far from being established in all respects. Nurses and parents do not observe from the point of view of description and record, but rather from that of immediate practice and care. Parents are often unfitted, by their bias and interests, to make unprejudiced observations of their offspring. Disinterested scientific inquirers, on the other hand, do not ordinarily have ready access to these newborn creatures.

Sentimental objections have also tended to impede the use, with infants, of those experimental techniques that are often required to make observation precise and quantitative. The attitude often accorded those who wish to experiment with infant behavior is well illustrated by an interview which the writer once had with a former gardener of Romanes. Romanes made observations of the "grasping reflex" which human beings show in their very earliest days. He sometimes allowed infants to support

their own weight by hanging to a rod which they reflexly grasped, as the rod was gently lifted. This gardener said, "Romanes would sometimes have dozens of babies hanging from the limbs of the trees in his orchard. He certainly was crazy."

The earlier observations, reported in the voluminous literature of child study, were usually of single individuals, or at most of a few cases. And they were conducted in a more or less incidental and desultory fashion. Later more intensive descriptions were usually limited to one or two infants. Only in recent years, and usually in connection with bureaus of child welfare research, children's hospitals, and special research enterprises, has more reliable and systematically planned and recorded observation been conducted. Such observations are those of Peterson and Rainey [1] at the Lying-in Hospital of the City of New York, of Watson [2] and his co-workers at Johns Hopkins University, of Gesell [3] and his assistants at the Yale Psycho-Clinic, of Baldwin [4] and Stecher at the Iowa Bureau of Child Welfare, and of the Bureau of Child Welfare Research at Teachers College, Columbia University. In other countries, especially in Germany, numerous reports have also accumulated, usually of observations on a less systematic plan.

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[1] Peterson and Rainey, "The Beginnings of Mind in the New Born," Bulletin of Lying-In Hospital, New York, December, 1910.

[2] Watson and Watson, "Studies in Infant Psychology," *The Scientific Monthly*, December, 1921.

[3] Gesell, *The Mental Growth of the Pre-School Child*, 1925.

[4] Numerous bulletins of the University of Iowa Bureau of Child Welfare.

SIZE AND VARIABILITY AT BIRTH

Certainly the most obvious difference between infants and adults is their size. It may be useful here to indicate briefly the average measurement of some features of the human anatomy at birth, especially with reference to the comparison of boys and girls, and their relative measures of variability. The following table is taken from a report, by Hollingworth [5] and Montague, of the measurements and diversity of one thousand infants of each sex, taken from consecutive records in a large maternity hospital in New York City.

TABLE XI

VARIABILITY AT BIRTH

FEATURE MEASURED	GIRLS			BOYS		
	Average	A. D.*	A. D.	Average	A. D.	A. D.
			PerCent			PerCent
Weight, in grams.	3221	381	.118	3358	397	.118
Length, centimeters	49.9	2.27	.045	50.5	2.35	.046
Circumference at shoulders, cm...	33.8	1.88	.056	34.1	1.90	.056
Skull, bitemporal diameter, cm....	7.47	.72	.096	7.56	.72	.095
Skull, occipito-frontal, cm.....	11.2	.59	.052	11.3	.59	.052

* A.D.: Average deviation.

Other measures are given by these authors, but the above samples are typical. From the point of view of absolute size, boys are somewhat larger on the average, than girls, the differences being small. There is no dif-

[5] L. S. Hollingworth and Montague, "Comparative Variability of the Sexes at Birth," *American Journal of Sociology*, October, 1914.

ference in variability, as between boys and girls at birth. The emphasis which some writers have given to the presumed greater variability of either one or the other sex is not warranted at least on the basis of these physical measurements at the time of birth.

The ratio of about 2 to 1 holds in nearly all these measures, for largest to smallest infant. The greatest difference in the range is in weight, where it is almost 3 to 1 for females and 2.5 to 1 for males. Already, then, we begin to see the general principles of diversity manifested, the more functional trait (weight) is more variable than the more structural traits (such as height). The same principles apply to the measures recorded of stillborn infants.

PHYSIOLOGICAL FUNCTIONS

At the time of birth the rate of respiration and the pulse are about twice as rapid as in adult life, the former decreasing from about 44 to 18 per minute and the latter from about 130 to 70. The amount of sleep commonly indulged in is also about twice as great as that in the case of the adult. The newborn infant sleeps from 15 to 20 hours of the day. This sleep period declines on the average to about 11 hours at 5 years, 10 hours at 9 years, 9 hours at puberty, and 8 hours or less thereafter. The reasons commonly assigned for these changes are that the growing organism must not only keep up with repair, but must also provide surplus for the growth of most of the system. This involves not only larger relative amounts of food, but also oxygen, circulation, and perhaps also, more sleep, although the precise function of this last factor is still obscure.

SENSORY EQUIPMENT AT BIRTH

Many studies have been made of the sensory capacities of single newborn infants (neonates); several have been reported of small groups of a dozen or two; the largest number is reported by Peterson[6] and Rainey, in the Bulletin of the Lying-in Hospital of New York City (December, 1910). These authors made notes and tests on over one thousand infants during the earliest days (covering the first four weeks) and we may use their results as perhaps the most reliable of their kind.

Such observations tell us only whether or not the various senses function, and whether they function in their characteristic way, that is, respond to their own specific stimuli. The sign of function is always some motor response on the part of the infant, and it is not always possible to be sure that the response is characteristic of the sense as we know it. Thus an infant may react to a bright light, but the stimulus may be felt as pain, rather than as brightness or color; it may be the pain sense rather than the visual sense that is active. But observation of the type of reaction, compared with other reactions, may be used as a check upon inference.

The evidence is that at birth or shortly after, and even for some time earlier, the sense organs are ready to respond to their characteristic stimuli. Selective reactions are made, indicating at least that the sensory mechanism is in direct and appropriate connection with motor pathways.

Thus, of the one thousand infants, about eight hundred gave distinctive reactions to sweet, bitter, sour, and salt

[6] Peterson and Rainey, *op. cit.*

during the first week, and all of the rest during the next week. The reactions during the first week may be given as indication of their selective character.

SENSORY REACTIONS OF INFANTS

Response	Sweet	Salt	Bitter	Sour
Contented sucking	747	503	31	136
Discomfort reaction	37	295	780	659

The reactions to sweet and salt are strongly positive or appropriative in their tendency, those to sour and bitter are decidedly negative or retractile. It seems apparent that the sensory mechanism really distinguished these stimuli.

Of 944 cases responding to light by signs of discomfort, 839 were observed during the first week, and the remaining 75 during the second week. Of 144 cases reported as staring at a light, object, or person, 59 were observed during the first week, 73 during the second, 10 during the third, and 2 during the fourth. Using a rattle as a sound stimulus, two-thirds of the one thousand babies were found to react by squirming or other slight movements during the first week. Hearing may sometimes be delayed by the presence of amniotic fluid still remaining in the cavities of the ear. Other modes of sensitivity are fully as advanced as those here described.

REACTIVE CAPACITIES

Pessimistic philosophers have attached mystical significance to the initial cry with which the human being begins life. Immanuel Kant supposed it to be "a cry of

wrath at the catastrophe of birth." But this sound is only a mechanical consequence of the establishment of respiration, as the air first strikes the lungs.

Our best information concerning the reactive capacities at birth comes from the reports of Blanton,[7] Jones,[8] Watson[9] and his students, and from Peterson and Rainey. These accounts show that reflexes of various kinds are present at birth, or even several months before this date. Premature infants of as short a period as seven months may live and develop normally. Among the acts reflexly executed at birth, or within a very few days, may be enumerated the following:

Patellar reflex	Sneezing
Pupillary light reflex	Hiccoughing
Digestive reflexes	Excretion
Breathing	Yawning
Heart action	Swallowing
Smiling (?)	Sucking
Eye movements toward light	Erection

Other movements, of a more or less random and quickly established kind, are such as opening the mouth, mouthing movements, squirming, moving the limbs, toes, fingers, clenching the fist, convulsive eye shutting, wrinkling the brow, slightly lifting the head, flexing and extending the legs and arms, and turning the head sidewise when touched on the cheek, which becomes the basis of the nursing reaction.

[7] Blanton, "The Behavior of the Human Infant during the First 30 Days of Life," *Psychological Review*, XXIV (1917), pp. 458-483.

[8] Jones, "The Development of Early Behavior Patterns in Young Children," unpublished Ph.D. dissertation, Columbia University, April, 1926.

[9] Watson and Watson, *op. cit.*

Motor learning at once sets in. Thus Gesell describes the observation of an infant who in the first day of his life "cried at every pronounced new stimulus—as soon as he was picked up he cried; he ceased to cry when allowed to lie quiet. In two weeks his social environment induced a complete *reversal* of this relation between stimulus and response. He cried while he was in the crib; he ceased to cry when picked up. If he learned this in two weeks what can he not learn in twice two weeks, in two months and in four months?"

Blinking the eye is provoked at birth only by contact with the face near the eye, the eyelash, lid or cornea, or by a stream of air blown against the eye. There is no blinking at the shadow of an object nor at a moving object, at birth. But this reaction is acquired by the age of two or three months, apparently as a "conditioned reaction," since the shadow, which is usually a feature of being touched on the eye, comes to be an adequate stimulus for the blink. The original repertoire of movement patterns thus rapidly becomes enlarged by (*a*) transfer of responses to new stimuli, and by (*b*) change of responses to old stimuli. Many interesting features and implications of this process will be more fully described in the account of the following developmental period.

Intensive study of the reactions of the newborn in recent years has been directed by two chief aims. One has been that of discerning what psychological features the individual owes to his original nature and heredity. The other has been that of finding special processes or acquisitions that will serve as useful diagnostic and prognostic signs of the rate and limits of development. Both problems are complicated, the first by such facts as that much

of what original nature provides need not appear in these early days; the second by the great diversity of performance in the first days of life, and the difficulty of securing constant conditions of opportunity and exercise.

Grasping, apparently a vestigial reflex, is present in the early days. The infant, not yet able to oppose thumb to fingers, grasps a stick firmly with the latter. The utility of such a reaction in the phylogenetic series is obvious. It persists, according to Watson, until about the fourth month, with wide variations. Its disappearance coincides with the development of acquired habits of manual coördination. It seems indeed probable that it does not so much disappear, as become overlaid or inhibited by these more serviceable habit reactions. In cases of defective development, the grasping reflex may persist unduly.

The Babinski reflex, a fanlike lifting of the toes upon stimulation of the sole of the foot, a reaction that is pathological in adults, is normal to the early days of infancy, and during a considerable part of the first year. But it does not always appear then, and its disappearance is also quite variable. Eye coördinations are observed to develop through three stages: (1) roving movements, which are present at birth; (2) following an object moving in a line, which movements appear appreciably later; (3) following objects that move in a circle, this coördination not being perfected until after the third month of postnatal life.

Crawling movements appear not in fixed patterns, but seem to be built up individually according to the play of random movements and habit formation, under the limitations of muscular and skeletal structure. Swim-

ming movements, formerly described as native reactions, supposedly inherited and early manifested in line with the doctrine of recapitulation (concerning which more will be said in a later connection), do not appear. Watson has in a few cases tried to elicit these reactions by placing newborn infants in water. He observed only "violent expression of fear—a cry, checking of the breathing, followed by deeper inspiration, and rapid, entirely uncoördinated slashing of hands and feet." Even in other young mammals the swimming reactions were probably not observed at birth, but only after considerable activity. Their swimming, as in the case of the dog, is perhaps only an attempt to walk, which however gets them along in the water.

Many other conventional or typical reactions appear in due course. They are in part intrinsically determined, and must await the maturing of structures and nervous connections. They are in part extrinsically determined, and vary with circumstance and surrounding. For these reasons the attempt to fix the definite dates of their appearance meets with little success, because of the wide individual differences.

Thus sitting alone is not possible at birth, and is presumably an important developmental index. But while Watson reports it as normally appearing at about six months, Jones places it at seven to eight months, and Gesell places it at nine months, in his normative summaries. Opposing the thumb to the finger, in grasping objects, is not possible at birth. Watson reports it to appear normally at about 100 days, Jones at 150 to 180 days, and Gesell puts the first thumb opposition (in grasping a cube) at six months, which is nearer 200 days than

100 days. Reaching for, grasping, and manipulating objects Watson assigns to the fifth month, Gesell to the sixth.

It seems that for an adequate schedule of normative development it may be necessary either to rely upon the more definitely intrinsically determined features, or else to prescribe a standardized and constant set of early extrinsic circumstances. At present the measurement of early developmental status can be made only roughly, by applying numerous suggestive indices.

Much progress is being made in this field, in recent years, through the use of the laboratory method on large numbers of cases, as compared with the intensive study of individual infants, so common in the past. The difficulty of standardizing the conditions and technique of observation on infants makes it difficult to compare or to combine the results from the different studies now available.

A recent study [10] of large numbers of infants (two to five hundred, in the various functions) by Mary Cover Jones sought to determine in this way the sequence of maturation and development of an array of special functions such as had been previously referred to by other observers. In the following table are given the traits observed or tested, the age, in days, at which the various percentiles fall, and the number of cases observed by Jones in the period before the complete maturation of the respective functions. The 25 percentile means that one-fourth of the cases displayed the function at or before the age given; the 50 percentile indicates the age of the average infant at the time of the ability described (half earlier

[10] Jones, *op. cit.*

and half later than this age); the 75 percentile gives the age at which three-fourths of the cases, a distinct majority, showed the ability.

For an individual infant to show a given function at an age between that of the 25 and 75 percentiles indicates therefore that this infant belongs in the "middle 50 percent" or "normal" group with respect to the development of the trait in question. To show the trait before the age of the 25 percentile indicates marked early development, whereas to show it at an age later than that of the 75 percentile shows the individual to belong in the slowest quartile of the cases. Jones reports that 85 per cent of the individual cases reported in the literature by the method of intensive biography show more rapid development than the average of the cases observed by her.

TABLE XII

AGE OF DEVELOPMENT OF EARLY BEHAVIOR PATTERNS

(*Data adapted from Mary Cover Jones*)

TRAIT	PERCENTILES			CASES
	25	50	75	
Smiling	45 days	58 days	68 days	185
Eye coördination				
Horizontal	45	58	72	312
Vertical	53	65	78	283
Circular	65	78	91	272
Blinking	60	76	92	317
Opposing thumb	129	148	181	512
Reaching	135	152	173	486
Sitting	205	217	250	292

Of these patterns Jones remarks, by way of summary: "The first five . . . attain complete development by the fourth month. The last three . . . begin near the end

of the third month and have a long developmental period lasting into the tenth month."

APPRECIATION VS. EXECUTION

A tentative developmental law is suggested by some of the aspects of these reactive adaptations, which may be expressed by the words *"Appreciation precedes execution."* Thus the sensory mechanisms are perfected before the motor coördinations are ready to make the best use of them; language is understood some time before the individual is able to talk; reading precedes writing; recognition is easier than active recall. At least in some cases this law is perhaps related to the process of myelination.

Nerve fibers, before they function, develop a translucent sheath or covering, the myelin. The various parts of the nervous system develop this myelin sheath in more or less serial order. It is believed that in some of the association tracts of the cerebrum the process continues until late in adult life, and is the chief structural brain change that is correlated with educational effects.

This serial order of myelination is described by Ferris [11] in the following way:

> In general the myelin sheaths are assumed first by the peripheral sensory and motor nerves, thereby completing the reflex mechanism which in man occurs at about the sixth month of pre-natal life.
>
> Following this the different groups of cells in the spinal cord are associated by the development of the myelin sheaths on the connecting nerves, thus arranging for association of the reflex actions.
>
> Still later the nerves connecting the spinal cord with the

[11] Lull, *et al., The Evolution of Man,* p. 47.

cerebellum myelinate, thus completing the mechanism for the coördination of movements.

Then the afferent nerves, which connect the spinal cord with the brain, assume their myelin sheaths, thus preparing the pathway for sensory impressions.

Not until after birth, however, are the efferent tracts connecting the cerebrum and spinal cord myelinated, thus placing the cerebrum in control of the parts below and completing the motor pathway.

This late completion of the motor tracts in man explains the great helplessness of the human infant at birth, a condition which is in striking contrast to that in many of the lower animals.

EMOTION AND INSTINCT

If we mean by instincts such discriminative, organized, and utilitarian activities as are exhibited by many birds and insects, all that we can find under this head in the newborn human being lies in the repertoire of vegetative and protective reflexes, including sleep. Whether the more characteristic action patterns displayed in common by human beings in later life are due to later maturing of intrinsically determined mechanisms, or to the building up of attitudes and habits under common environmental and social pressures, is still problematic.

The less coherently organized adjustments, involving particularly changes in visceral processes, muscular tonus and tension, and including peripheral changes not clearly directed at external stimuli nor concerned in their manipulation, are commonly designated emotions. The enormous array of varieties and nuances of emotion in adult life has led only to controversial attempts at classification.

At birth or shortly thereafter at least four of the fundamental attitudes may be observed. We may call these re-

sistance, content, startle, and gloom. They constitute the germinal basis of the four major emotional systems of anger, joy, fear, and sorrow. The simple and relatively undifferentiated nature of these primitive attitudes is shown in the following descriptions of them and their occasions:

1. *Resistance* (called anger by some observers) is used to indicate a general set of adjustments, including striking, jerking, flexion of arms and legs, crying, rigidity, holding the breath, and, somewhat later in development, coördinated pulling, tugging, pushing, kicking, and the like. The observed effective stimuli, at or near the time of birth, include chiefly interference with the free play of motor activity, or obstruction of a movement under way. In later life this reaction pattern seems to evolve into the elaborate set of protest reactions, anger, rage, expostulation, hatred.

2. *Content* (called joy by some observers, love by others) is shown by a variety of responses, including lying quiet, smiling, gurgling, cooing, ceasing to cry, general bodily relaxation, and, later, appropriative and seeking movements, calculated to prolong the stimulus. Among the stimuli to this general reaction pattern are stroking, tickling, or massive stimulation of various sensitive skin regions, gentle rocking, light shaking, patting, nursing, and being left alone.

3. *Startle* (sometimes called fear) is described by Watson [12] in the following words:

The responses are a sudden catching of the breath, clutching randomly with the hands (the grasping reflex invariably

[12] Watson, *op cit.*

appearing when the child is dropped), sudden closing of the eyelids, puckering of the lips, then crying.

The principal situations which call out the fear reaction are (1) to suddenly remove from the infant all means of support, as when one drops it from the hands to be caught by an assistant; (2) by loud sounds; (3) occasionally when an infant is just falling asleep or is just ready to awaken, a sudden push or a slight shake; (4) when an infant is just falling asleep, occasionally the sudden pulling of the blanket upon which it is lying will produce the fear response.

4. *Gloom* (which might be indicated by other terms such as discomfort, dejection, grief, sadness) does not appear in its recognizable adult form until somewhat later. Nevertheless a vague depressive reaction which seems to constitute its germ is present after no great delay. Perhaps its earliest indication in these days is the discontented crying that is aroused by imposed shifts of position and similar changes of condition not potent to arouse the attitudes of startle or resistance. Later it is seen in a general reduction of bodily tonus, in the postural droop and loss of vivacity that accompanies illness, and in the facial expression accompanying loss and deprivation.

WHOLE-HEARTEDNESS AND GRADATION

A commonly observed feature of infantile emotional attitudes is their "whole-heartedness." Rivers [13] suggests that this "all-or-none" character belongs not only to simple reflexes, but also to protopathic sensation, autonomic reactions, and the characteristically human instincts and emotions in their early developmental stages. At this time there is an absence of that *gradation* of reaction to

[13] Rivers, *Instinct and the Unconscious*, chap. viii.

the intensity of the stimulus that appears in the later life of the individual.

This "whole-hearted or not-at-all" principle throws very instructive light on infantile and childish outbursts. The intensity of the stimulus, the magnitude or importance of the occasion, bear, in the beginning, little or no relation to the vigor of emotional display, which either occurs with full force, or does not appear. Many of the tantrums and inexplicable rages, fears, and attachments of childhood become intelligible on this basis.

Growing up, emotionally, consists in part of imposing a system of graded reactions upon this all-or-none condition. The method by which this is accomplished, and by which the various attitudes are connected with an ever increasing range of effective stimuli, will be considered in the following chapter.

Aside from this imposition of gradation, and the attachment to new stimuli, emotional development consists in an elaboration and complication of these attitudes, their incorporation of varied impulses to action of the manipulative sort, and their suffusion with that cognitive element which we shall later come to know as meaning.

The complexities of developed emotional life are suggested by Shand's summary account of the relations of the four primary or major emotions in maturity. "Every primary impulse, whether it is independent or belongs to a primary emotion, is innately connected with the systems of fear, anger, joy, and sorrow, in such a way that, when opposed, it tends to arouse anger; when satisfied, joy; when frustrated, sorrow; and when it anticipates frustration, fear; these systems being similarly connected together."

MEANING AND THOUGHT

Many writers have attempted to describe the infant's "consciousness," in answer to the familiar question, "What is going on in his mind?" Thus Peterson and Rainey surmise that "the new-born child comes to the world already with a small store of experiences and associated feelings and shadowy consciousness . . . received and stored up in the dim storehouse of a memory already begun. . . . There is already a feeling tone associated with the earliest reactions."

James suggested that "the baby, assailed by eyes, ears, nose, skin, and entrails all at once, feels it as one great, blooming, buzzing confusion." Thorndike's description [14] of what the animal's consciousness must be like may be applied equally well to the infant. "It is most like what we feel when consciousness contains little thought about anything—when we feel sense impressions in their first intention, so to speak; when we feel our body and the impulses we give it. Sometimes one gets this animal consciousness for awhile in swimming, for example. One feels the water, the sky, the birds above, but with no thoughts about them, or memories of how they looked at other times, or esthetic judgments about their beauty; one feels no ideas about what movements he will make, but feels himself make them, feels his body throughout. Self-consciousness dies away. Social consciousness dies away. The meanings and values and connections of things die away. One feels sense impressions, has impulses, feels the movements he makes; that is all."

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[14] Thorndike, *Notes on Child Study.*

A more recent suggestion is that of Koffka [15] who objects to the "separateness" and "fragmentariness" of the earlier accounts of "the infant's phenomenal experience" in terms of "a confused mass of separate sensations, some of which are present earlier than others because of the earlier maturation of their appropriate brain centers." Koffka insists that "the first phenomena are *qualities upon a ground.*" These are "the simplest mental configurations. The phenomenal appearance in consciousness divides itself into a given quality, and a ground upon which the quality appears—a level from which it emerges.

"According to this view, the most primitive phenomena are figural; as examples, the luminous point set off from a uniform background; something cold at a place upon the skin set off from the usual temperature of the rest of the skin; the too cold or too warm milk in contrast with the temperature level of the mouth cavity . . . perceptive phenomena are something other than 'organic feelings'; the distinction between subject and object is not learned, but is given, no matter in how primitive a form, in the very first phenomena of the infant mind."

The essential point is that in this early experience processes are as nearly as possible mere *contents,* lacking the element of *meaning* which is so characteristic of adult experience. The infant does not think *about* things, he is entirely occupied with thinking *at* things, or *with* them. But in this condition lie the germinal elements of that elaborate life of *reference, significance,* and *symbolic function,* which comes to constitute the essential distinction between thinking and acting.

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[15] Koffka, *Growth of the Mind,* pp. 131*ff.*

A noteworthy feature of this early period is the conspicuous rôle played by the so-called "lower senses." The typical originally effective stimuli to the vague reactions designated anger, joy, fear, and sorrow are tactile, organic, kinesthetic, static, and gustatory. Sound plays a minor rôle, except in general attention getting and in the case of fear. Except for their power to set up general attitudes of attention and to provoke ocular activities of fixation and pursuit, visual stimuli appear of little concern to the infant.

In future development, however, it is just these "distance receptors," the "higher senses," that will come to bulk large in the elaboration of meaning and symbolism, through the process of substitution and the mechanism of redintegration. It is in these sensory modes that the systems of speech, of oral and graphic language will evolve, and from which the fine arts will chiefly draw their materials.

SUMMARY OF INFANCY

We may briefly recapitulate the description we have given of the mental equipment of this period of development by indicating three distinctive *lacks* or *inadequacies* which characterize it, and which must be supplied through the coöperation of extrinsic factors, or *experience*.

(*a*) In activity and motor ability the infant lacks coördination and voluntary control. It must acquire the capacity to respond to a sign or cue, as well as to the original stimuli to its native repertoire of movement.

(*b*) In the field of emotion, the infant lacks gradation of response to degrees of stimulation intensity or importance, and its native attitudes must yet be modified, inte-

grated, and especially, attached to a wider array of discriminated stimuli. It has yet to develop a hierarchy of interests, values, and attachments and a graduated system of attitudes.

(*c*) The infant lacks a system of meanings and references, which, as constituting thought, must come to replace the "buzzing confusion" of early experience. It must acquire a field of symbols and a context of significance.

Coördination and voluntary control, gradation and transfer, symbolization and meaning, these are the conspicuous lines along which development is to be traced in the ensuing stage of growth and learning.

CHAPTER IX

BABYHOOD—THE FIRST THREE YEARS OF CHILDHOOD

THE MEANING OF INFANCY

Many have called attention to the prolongation of infancy [1] in the higher forms of animal life. In general those species most helpless in infancy have longer periods of immaturity, retain longest their plasticity or learning power, and are, when completely developed, the most complex and intelligent. The animal born to react to a simple and relatively fixed environment is fairly adequately equipped, at birth, with mechanical reflexes which serve the purposes of its future life, although even the simplest forms show some capacity for learning.

A more complex and changing environment demands a different sort of equipment. There must be larger capacity for varied response and adaptation with provision for the elaborate organization of special habits according to the particular character of the environment. From its first day an infant fish is nearly as capable as an adult, and it is difficult to teach it the very little that it can learn. Fledgeling crows or chickens require some weeks for their independence to be accomplished, but they are fully matured in a few months and the learning of which they are capable, while appreciable, is decidedly limited. The newborn puppy is helpless for a longer time,

[1] Fiske, *The Meaning of Infancy.*

during the first year he is constantly learning, and continued capacity for intelligent adaptation is so considerable that he becomes humanity's favorite pet.

The human child is helpless for months, dependent for years, immature for nearly a generation, and capable of learning of the most complex variety throughout a century of time. Infancy thus assumes a profound significance in human life. It is longer with civilized man than with savages. It becomes further prolonged as civilization increases in complexity. Among the professional classes economic and other forms of dependence upon parents often endure for twenty-five years or more, as the age of assuming business and domestic responsibility becomes postponed by the necessities of education and apprenticeship. The period of plasticity also must, if possible, be extended as changes in industrial and social technique come in increasing number and rapidity.

In still other ways the period of infancy deeply affects human relationships. The prolonged helplessness of the offspring keeps parents together, establishes family life, and in large measure contributes to the formation of social life in general. The tasks of infant care and training exert their influences on the characteristics, interests, and thought of adults, and thus indirectly affect the color of all institutions. The presence of the young, and the need for their protection extensively modify conversation, literature, art, religion, legislation, taxation, and become the basis of our elaborate educational systems.

Many of our standards and ethical conventions depend primarily on the presence of children, on the need for their socialization, on the danger of their bringing ignominy, care, and expense to the parents or to the state.

And, as we shall see more clearly at a later point, many of the problems of mental hygiene arise from the difficulties of severing hearth ties and avoiding parental fixation.

ACTIVITY ORGANIZATION AND CONTROL

At birth, as we have seen, the human being appears as a sensori-motor mechanism, with many sensory avenues and a small number of specifically established pathways of motor response. Each incoming stimulus tends to radiate over all outgoing pathways, thus provoking varied and random responses, which, with the established reflexes, and the vague emotional patterns, come to constitute the basis for later organizations.

The earliest observable indications of reaction to external stimuli are of three forms. Aside from reflexes or emotional patterns, and random movements, there is to be observed the characteristic checking of activity by external stimuli. The earliest movements seem to be instigated chiefly by internal stimuli, processes going on within the organism. The crying and restlessness occasioned by these general bodily conditions may early show sudden *inhibition* by auditory, tactual, and visual stimulation. A common form of this inhibition of ongoing activity is the familiar attitude of attention. This attitude is not one of mere passivity; instead there is evidence of general tension and characteristic posture.

An early developmental phenomenon is the following: external stimuli, occurring concurrently with internal excitants, become connected with the ensuing motor reaction, and in time are themselves potent to evoke it. The rôle of external events becomes magnified. Move-

ments at first reflex and random become organized into patterns associated with particular outer stimuli, and this is the first stage in the development of voluntary control.

These early movement systems become adapted to inner needs and to the satisfaction of vague states of discomfort, through the ways in which they manipulate and modify external surroundings. In this way they serve in the attainment of *ends* or results. In time fragmentary and partial details of external situations become able to instigate adjustments originally made to the total situations. Incidental bodily conditions and stimuli, occurring concurrently with these details, may also become thus potent in new directions. Internal signs and clues of the need which the learned adjustment modified or removed thus become adequate stimuli to those very adjustments. This shift constitutes the acquisition of *voluntary* control. Movements are now made *at will.*

The process is extremely significant for psychology. First the effective internal stimuli, then the establishment of adequacy in connection with concurrent external stimuli (especially from the "higher senses" of vision and audition), then the potency of new and concurrent internal stimuli. This series of shifts, underlying the attainment of voluntary control, occurs through the fact that partial or associated details of a situation become potent to evoke reactions originally consequent upon the entire stimulating situation. It is this process to which we give the technical name "redintegration." It is this potency of partial details that constitutes the fundamental feature of "mental activity" or "psychological life." [2]

[2] H. L. Hollingworth, *The Psychology of Thought*, 1926.

The bewildering course of these organizations during the early months and years of childhood is difficult to trace. This complexity is occasioned both by the still maturing intrinsic factors, such as the process of myelination, the enlargement of muscles, the increasing rigidity of the bony framework, and by the instability and diversity of the extrinsic factors, the environmental stimuli.

The tracing of these organizations in detail cannot be undertaken in this brief survey. Volumes on the early years of childhood contain a great wealth of concrete observations, which we must here subordinate to the statement of general principles.[3] During the first year the changes may be notably observed in the development of eye-hand coördination; in the manipulation of bodily parts; in head balancing; maintenance of equilibrium; in the assumption of the sitting and standing postures; in the playful activities of numerous muscle groups, including those of the vocal organs; in the perfection of the balancing, the extensor thrust, and the stepping reactions which, under the influence of organization, incentive, and often of adult assistance, become the complex act of walking, which is usually accomplished shortly after the first twelve months.

DEVELOPMENT FROM FUNDAMENTAL TO ACCESSORY

A general principle has long been familiar to students of child psychology, which not only attempts to summarize the course of motor development, but also suggests a re-

[3] Many detailed observations, accompanied by interesting photographs of infants and young children in action, are to be found in the following recent volumes: Gesell, *The Mental Growth of the Pre-School Child,* 1925; Baldwin and Stecher, *Psychology of the Pre-School Child,* 1924.

lated principle in the development of perception. This principle, embodied in the slogan "From Fundamental to Accessory" has, if interpreted with understanding, a certain bearing also on the hygiene of play and training in the early years. The principle assumes somewhat different shape in the hands of various observers.

Stanley Hall seemed to mean by "fundamental" the larger muscular systems, closely adjacent to the trunk, "which in general man has in common with the higher and larger animals." By the "accessory" systems he meant "smaller and more numerous muscles, whose functions develop later in life and represent a higher standpoint of evolution." The observed sequence of activity and coördination do not well accord with this description. Eyes, toes, fingers, and the facial muscles, in their lively play, suggest that their mechanisms mature fully as early as those of the larger muscles of limbs and trunk.

Bolton describes the fundamental as the "vital and necessary"; the accessory as "that which is less vital and in a way less necessary to existence." It has been pointed out by others that this formulation, while it does describe the early appearance of the digestive, pulmonary, circulatory and excretory reflexes, does not so neatly apply to the development of voluntary control, which is the characteristic set of changes in postnatal days and to which the law is supposed to apply.

Other interpretations of the formula have been, as by Bryan and by Hancock, that "within any series of coordinated muscles the larger ones mature first"; and, by Shepardson that "voluntary, purposive control is from those that are oldest in the race to those that are youngest."

Norsworthy and Whitley [4] accept the last of these as "the one most in accord with the facts known. An observation of children's plays shows that in the spontaneous muscle movements made therein the larger muscles play a major part, the smaller muscles within a series coming into use later; and that when movements are willed, those involving the larger muscles within a series require less effort than do the smaller coördinations." "The practical outcome of the theory . . . is to emphasize the value of large movements for little children, and to suggest the economy in both time and effort in the postponement of movements requiring fine coördinations. It also emphasizes the need of spontaneous, free exercise of all movements before the voluntary, purposive use of them."

The generalization of the principle applies to fields other than that of the simple voluntary control and organization of movement. Something like this sequence is found to characterize the development of play, the acquisition of speech and reading, and the phenomena of perception as a whole. Development is often, at least, from the vague and general to the definite and specific, just as in the building of a house, a landscape, a book, the general outline or framework precedes the details of finish and embellishment.

RIGHT- AND LEFT-HANDEDNESS

A striking feature of human motor activities is their predominant right-handedness, shown by all but about 5 per cent of people. Although the evidence is far from conclusive, right-handedness seems to be a vivid indica-

[4] Norsworthy and Whitley, *The Psychology of Childhood,* 1920.

tion of the rôle in development of what we have called extrinsic determination. Experimental studies of the relative strength, amount of free activity, and preferred use of the two hands, reported by Watson,[5] fail to show evidence of handedness at the time of birth.

Yet most children manifest unequal use of the two hands at least by the middle of the first year. This shows in the form of better dexterity, greater strength, and preferential use. Is the prevailing right-handedness due to intrinsic differences in constitution, or to the influence on the individual of the surrounding right-handed world? From the beginning one is more commonly handled by individuals with right-handed characteristics, and nearly every one who approaches, takes the hand, offers objects, will do so in a right-hand manner, and in a manner which invites right-handedness. Tendencies to left-handed activities are often expressly interfered with.

Even domesticated animals develop these characteristics of sidedness, under the manipulation of a right-handed world, although animals in their native state have never been shown to manifest sidedness. To what are we to attribute, then, the prevailing right-handedness of children in their earlier as well as their later days?

Theories of intrinsic determination have been offered in various forms, most of them entirely speculative. Occasional bits of experimental data have also been offered. Joteyko finds that exercise of the left hand and arm has a greater effect on heart action than does exercise of the right side, and that this is true both for right-handed and for left-handed people. If there should be such a necessary physiological relation, this might make it expedient,

[5] Watson, *Psychology*, p. 241.

since less exhausting, to use the right hand by preference, and this might result both in native inclinations and in institutional fixation in the form of custom.

Jones contends, on the basis of many measurements, that "born handedness is revealed by the measures of the bones of the arm, the major arm having the larger bones; adopted handedness is shown by the muscle swell, the adopted or preferred arm having the larger percentage of muscle swell." Handedness has also been attributed to differences in acuity or control in the two eyes, in such acts as aiming, sighting, and the like. But none of these theories, except that of Joteyko, seem to point to essentially intrinsic bases for the preference for right over left.

Explanations in extrinsic terms have also been numerous. Such factors as the manner of carriage by the nurse or mother, sleep habits, differences in weight of the two lateral halves of the body, the advantages in combat of strong one-armedness over moderate two-armedness, have all been tried and found wanting. A favorite theory shows that in primitive traffic it was a great advantage to go to the right when passing others. This frees the right hand for employment of weapons of attack, the left hand being more quietly employed in holding the shield over the heart, on the therefore more vulnerable left side.

Various unverified statements of an intriguing kind have also been made, such as that right-handed individuals pass through an early period of left-handedness, and that right-handed persons become left-handed in that period of drowsiness that precedes sleep. Baldwin submitted to analysis reports on the gesture language of primitive people, finding the right hand to be predominantly used in such communication. He therefore

asserts that "It is evident that this report supports the view that the right hand was pre-eminently the *expressive* member in pre-historic times. . . . We have much reason for believing that right-handedness is originally a one-sided expressive function."

This suggests also the general finding that handedness is closely bound up with the speech functions. The correlation between the two is shown in the fact that the injuries to which are attributed the symptoms of aphasia (a complicated interference with the use and understanding of language, seen, written, spoken, or heard) are found on the right side of the brain in left-handed persons, but on the left side of the brain in right-handed. Since the two sides of the body are in general controlled by the opposite sides of the brain, it appears that the speech functions depend upon that side of the brain which has control of the predominantly used hand or side. (Sidedness applies to the use of shoulder, eye, and foot, as well as to the hand preference.) It is this fact which underlies the warning commonly given concerning the possible damage to the speech control and to general nervous stability which may be occasioned by the imposition of habits of handedness foreign to the native inclinations or early preferences of the individual. Clinical observation and case histories show the soundness of this warning, at least in the case of many.

We are therefore left with a rich array of interesting but inconclusive discussions of the phenomenon of handedness or sidedness. That this phenomenon does not show itself at the time of birth is of course not adequate evidence that it is not determined by heredity or native constitution. Handedness, in common with beards and

wisdom teeth, might perfectly well be due to later intrinsic influences than those culminating at or near the time of birth. But, in the case of functional features as contrasted with such structures as beard and teeth, it is difficult, if not quite impossible, except through extreme and inhuman forms of experiment, to eliminate such environmental pressures as come from the fact that, for whatever reason, even the implements and furniture of human life manifest a marked sidedness of construction, which reflects the functional sidedness of those who manipulate both the tools and the infant.

WALKING AND TALKING

Walking precedes talking, on the whole, although the definitions of both activities are not usually very precise. And of course walking is completely matured, as a coordination, long before speech development is finished. Both activities vary enormously, both with native developmental pace and with the effect of extrinsic factors. Thus learning to walk, although it builds upon elements of coordination that mature in relative independence, and on a hereditary basis, varies with such factors as body weight, the presence of walking playmates, the degree of "coddling and waiting on" accorded the child, the general usefulness or interest of the effects produced, general health and alertness, and the amount and persistence of adult encouragement and assistance.

Talking is not markedly in progress until the latter half of the second year, in average cases. Its progress will also vary with numerous extrinsic factors, such as the presence of others who talk, the degree of anticipation of wants by

others, signs of approval, specific attempts to guide the indicative use of native vocalization, the interest acquired in walking and general motor manipulation. In spite of their variability, walking and talking in their development are significant indices of the probable developmental pace of the individual, which will later be manifested conspicuously in intelligence measurements.

The following table reveals a number of interesting facts and tendencies in this connection. It is a combination of data from Mead [6] and from Terman.[7] Mead secured information concerning the age of walking and talking of 144 feeble-minded individuals (institutional cases) and of 50 children of graduate students of education. Terman secured similar data on 600 cases of "gifted" children whose intelligence quotients were 140 or more. Terman's criteria for walking and talking were "several steps" and "at least three words." Mead's criteria were less precise.

TABLE XIII

AGE OF WALKING AND TALKING

INTELLIGENCE LEVEL	AVERAGE AGE AND MEASURES OF VARIABILITY	
	Walking	Talking
Gifted (600 cases)	12.8 months S. D. 2.5 mo.	11.2 months S. D. 2.8 mo.
Normal, or somewhat higher (50 cases)	13.9 months A. D. 1.6 mo.	15.3 months A. D. 3.0 mo.
Feeble-minded (144 cases)	25.1 months A. D. 9.6 mo.	38.5 months A. D. 16.8 mo.

[6] Mead, *Relation of Intelligence to Certain Mental and Physical Traits*, 1916.

[7] Terman, *Genetic Studies of Genius*, chap. viii.

The following points are of special developmental interest:

(*a*) The gifted walk and talk earlier, and the feeble-minded later than the normal individual.

(*b*) Walking comes before talking, except in the case of the gifted; this precocity of talking is a significant sign of their general mental level.

(*c*) Without exception, variability in talking is greater than in walking, and the gifted are more advanced, the feeble-minded more backward, in talking than in walking, as the general laws of human diversity would have led us to anticipate.

Mitchell [8] reports a study of a group of 355 children just on the point of entering school. Along with intelligence measures there were secured, by a social worker who visited the homes, supplementary data of various kinds. In the following table these results have been adapted, showing the way in which intelligence quotient is related to six other factors as reported by parents.

TABLE XIV

DATA FROM PRE-SCHOOL CHILDREN

I.Q.	Median Age of Mother at Birth, in Years	Median Hours of Labor, in Hours	Median Weight at Birth, in Pounds	Median Nursing Period, in Months	Median Age at First Tooth, in Months	Median Age of Talking, in Months
41- 60..	37	3	10	11	7	18
61- 80..	33	3	8	11	7	18
81-100..	37	3	8	13	7	13
101-120..	33	3	8	11	7	14
121-140..	37	3	8	11	6	12

[8] Mitchell, "Psychological Examination of Pre-School Age Children," *Pedagogical Seminary*, 1924, p. 108.

The validity of these results is not great, because of the small number of cases, the lack of precision in the reports, the diversity of the informants. But taking them as they stand they show no relation between intelligence quotient and any of the factors, age of mother at birth, hours of labor, weight at birth, nursing period, age of cutting first tooth. The one item that is definitely related to intelligence is the age of beginning to talk. This is just the one of the various factors that could scarcely be expected to exercise a determinative influence on development in intelligence. Instead it is a consequence, and therefore a sign, of developmental pace. Language is one of the most direct indicators of that general level of capacities which we use the word intelligence to summarize.

THE ACQUISITION OF LANGUAGE

This distinctively human development is man's supreme accomplishment. Without it, his complicated civilization could not have come into being. His most profound reflections consist in the utilization of language material, in one or another form. Essentially the development of language consists in the substitution of signs or cues, which we call gestures, words, figures, symbols, and the like, for original events and situations. The language material, as it appears in human thought, is by no means limited to verbal elements. In solitary thinking a rich play of events, comprised of such stuff as imagery, subvocal utterances, incipient gestures, attitudes and postures, feelings, and the varied relations of such materials, also provides a language, the language of thought as distinguished from that of conversation and writing.

It is in this field that occurs that elaboration of symbol and thing signified that builds up the structure of meaning and reference. In graphic communication the process is seen to pass through several stages, more or less evident also in the historic growth of the complicated systems which the individual must come to learn.

First comes the object or situation itself. For it there is substituted a portion of it (rough sketch of outline, shape, and the like) or some associated detail. This imitative sketch in turn gives way to conventionalized forms in which only certain significant features of the original survive, a curve, the number of points, differences in size, spatial relations, and the like. The conventional elements, originally standing for complex situations, in time give way to compositions made up of designs each of which represents (functions in place of) the more elementary components of these complexes. These become standardized and may be variously combined to comprise such a written language as that of China or Egypt. Only much later or under different circumstances is the alphabet, which adopts visible signs corresponding to the elements of spoken language, evolved. The alphabet is thus not a direct development of primitive graphic communication, but an imposed correlate of spoken language.

The origins of spoken language in the race are entirely hypothetical. But in the individual development of speech the process has been observed in great detail. Many volumes have been written describing the speech development of individuals and of groups. To compress these observations into small compass, without the inclusion of qualifications and cautions which constantly press for recognition, will not be easy. But our task is much simpli-

fied by the observation that the same redintegrative mechanism [9] that we found to underlie the development of voluntary control of movement also describes the course of speech development. In this process a detail or an associated feature comes to function for a larger complex. The detail is the symbol; the larger complex, which is a past event, is the object or situation meant or intended or referred to. The substitution of this detail for the larger complex in the instigation of subsequent events is the phenomenon of meaning. How does this process operate in the concrete acquisition of speech and its use in communication and thought?

The following typical stages may be briefly indicated, with the caution that individual cases vary in devious ways from this pattern.

1. A period of primitive vocalization, consisting for the first two weeks or thereabouts chiefly of the undifferentiated cry. By the end of a month this has become differentiated so that it varies somewhat with the general condition, such as that of hunger, pain, anger. On this background develop random vocalizations, cooing, gurgling, squealing, and staccato-like sounds. These do not yet represent language, although they may be utilized by caretakers as signs of the general conditions in which they more commonly emerge.

2. As this practise continues, the various random vocalizations tend to become linked up with the acts and objects to which they have led through the habits of the caretaker. Various random sounds thus come to stand for special bodily needs, discomforts, satisfactions, and

[9] H. L. Hollingworth, *Psychology of Functional Neuroses*, 1920, and *The Psychology of Thought*, 1926.

interesting objects, if the caretaker consciously or unwittingly is led to act in terms of them. They are not words in their later forms, but quite random ejaculations such as "Kha," "Aw gaw," "Gong," "Na-na," "Ma-ma." These vocalizations are reported as similar in the case of infants of different races, who will later develop quite diverse languages. When the object is seen, the "word" may be uttered; or the word may be uttered and repeated in a situation or condition for which the object would constitute a desirable addition.

3. Meantime, the caretakers and others who occupy themselves with the infant, are employing speech and facial expression, along with gesture, in connection with all their acts, and in connection with numerous objects and events that catch the infant's attention. Chance acts of his own are associated with words on the part of the observers. In time the sound of these words will suffice to evoke those acts with which they have been associated. Thus when the infant by chance raises her arms in air, the fond mother exclaims, "How high is little Emma?" This repeatedly occurs. Soon the exclamation, "How high is little Emma?" provokes in the infant the act of arm raising, especially if this, upon its first occurrence, is accompanied by smiles, pats, and other pleasurable stimulation.

The true nature of this stage of "language recognition" or "understanding" is shown by the fact that such an exclamation as "Da, da, da da da, da, da?" if made with the same tone and inflection or intensity, will also provoke the "arm lifting" response. The stage is one chiefly of discrimination of tonal patterns, with no clear discrimination of the verbal elements as we think of them

in writing. "Appreciation precedes execution"; "development is from fundamental or vague to accessory or detailed." The determination here is almost entirely of the extrinsic form.

4. A fourth stage is noted as vocalization becomes more active, and as the playful vocal activities hit upon sound formations resembling those used by the infant's associates. These when they occur, perhaps because of their familiarity, receive special attention. They are often repeated, monotonously, as if their use gave special pleasure. Such use also renews the connection between these words and the objects or events for which they have already been used by the caretaker, and their employment often leads to the speedier attainment of satisfactions. Such repetition also has another value, in that through it the sound of a word, as spoken by self or others, is linked to the act of articulating that word. Thus the capacity to *employ* language becomes integrated with the understanding of sounds. Such sounds then come to be used not only as indications of things present, but also in the way of demands for absent objects or persons. Under tutelage the early single word speech, comprised of such elements as "By-by," "Up," "Daddy," "Bow-wow," and the like, evolves. The single words (often called sentence words) are used to stand for complex situations, which will later be described by elaborate structures. Thus "Bow-wow" may mean (being interpreted) the same as the later explanation: "I can't find my doggy, but I'd like to play with him and I wish some one would look for him and bring him to me." Or the single word "Cracker" later is elaborated into "Why doesn't my mother or somebody go to the table and get me a cracker to eat?"

5. This structural elaboration comes slowly, and constitutes a fifth general period of linguistic development. Most rapidly are acquired a set of nouns and verbs, employed, however, with no precise recognition or discrimination of their grammatical functions. A few modifiers also come early. "Word pairs" are first used, which seem to represent an initial analysis of the complex situations into their recognized components, thus: "Baby go," "Cracker want," "More pencil." Adjectives, adverbs, and variations in form, such as those of tense, come later, followed by prepositions, conjunctions, pronouns. Only gradually are the conventional relations and sequences perfected.

Names are first descriptive of whole situations, but seem especially prompted by any striking detail of those complexes. Thus any bearded or loud-voiced person may be called "Papa"; any hairy animal, or even a muff or velvet coat may be called "kitty." On the one hand the components or abstract elements of situations are not yet discriminated, as with the small boy who could illustrate "vertical" with a pencil, as the teacher did, but not with a knife, as his father requested. On the other hand, a trivial feature of such complexes may elicit the name commonly used for the total situation. The recognition of common elements in different situations is thus virtually present in this redintegrative effectiveness of details. Abstraction of the "universal" features in their own right comes only with added experience and increased vocabulary.

The essential thing in linguistic development is therefore the building up of a repertoire of symbols, which must include not only words, but also such features as

word order, word modifications, sentence structure, and the various factors in inflection, intonation, and the like. The use of these symbols in the place of the original situations, the partial detail or feature functioning for an initially larger complex, exhibits once again the characteristic mechanism of mental process, both in the response to speech and in the employment of it.

Studies of the acquisition of individual vocabularies have been numerous, but seldom made on individuals known to be of average intelligence. Since speech development is determined not only by developmental pace but also by numerous forms of environmental stimulus, the results vary considerably. Estimates have also been made, in various ways, of vocabulary limits at different ages. The results vary with the methods used, the lists of words employed, and the criteria of word knowledge. The vocabulary of understanding varies much from that of definition and actual employment; that of oral speech differs also from that of written communication.

Speaking in a very rough way, on the basis of the vocabulary reports and estimates now on record, we may expect that by the age of two years the individual will have a vocabulary ranging anywhere from twenty to three hundred words. By the age of eight years a vocabulary of three thousand to five thousand is estimated as normal; this is doubled by twelve and again doubled by sixteen, in the case of relatively superior intelligences.[10]

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[10] Stern, in *Die Kindersprache*, 1907, gives a detailed account of individual speech development. A convenient summary is to be found in Buehler, *Die Geistige Entwicklung des Kindes;* chap. v of Buehler also gives an interesting account of children's drawing.

MEMORIES OF INFANCY [11]

Attention has often been called to the rather striking fact that our memories of events and experiences seldom reach back into this early period of the first three years. Experiences of these days do not recur in the form of images, ideas, or words, at any rate. It is only at a later date that experience begins to be organized into the system of these symbols which make retention and recall possible. How are these facts to be explained and in what sense do we forget our early years?

In the first place the statement that we retain no memories from these days, if not qualified, is incorrect. We learned to walk during this period and still remember how. A considerable part of our vocabulary was acquired during this period, and we still employ it. The "experiences" of those days were in many ways limited; in so far as they consisted of muscular activities and coordinations, we do remember them. But we do not find ourselves able to narrate the attending circumstances. The events of these days have little "meaning," little context. And it is chiefly through the rôle of context that we ever do "remember." Individuals whose memories do extend back into the earlier days, in the usual sense of ability to describe, perhaps represent instances of advanced development, in which mental age ran far ahead of chronological age. To "recall" an earlier experience or event means to be capable of a symbolic report of it. Such reports are commonly in terms of language. The inability to report infantile experience is therefore appar-

[11] See also Part V, on "Memory" in Stern, *Psychology of Early Childhood*, for general account of memory in infancy.

ently chiefly dependent on the absence of established language habits in those early years.

The fact that habits of action and habits of attitude and emotional reaction may be established in infancy and may persist in later life, with no recall of the circumstances of their formation, is a very significant one for development. For one thing it means that inexplicable feelings of repugnance, dread, shame, satisfaction, originally set up in connection with events, situations, or persons in those days, may now be touched off by the details of present experience, with no adequate grounds for their occurrence except this history. In recent years certain forms of neurotic involvement have been attributed to such early bias. From this point of view the first three years of childhood assume an important rôle in the general development of character, temperament, and attitude.

From the point of view of training, it is also useful to realize the great possibilities of this period. For habits of action, of emotional adjustment, of obedience, of cleanliness, of consideration, and the like, may here be established with whatever accompaniment of penalty may be required. The habits will tend to persist, without that memory of the circumstances of constraint and without the feeling of resentment that often survives from the effort to compel such habit formation in the later years. Habits set up in these early years are more likely to appear later in the guise of personal tastes and constitutional preferences, since the personal circumstances attending their formation are not recalled. It is important to realize in this connection that the word "habit" applies to intellectual and emotional attitudes as well as to patterns of movement.

EMOTIONAL GRADATION AND TRANSFER

The developmental mechanism of emotional gradation and transfer may be illustrated by the following examples. Bears are taught to dance by first being put on hot grills while music is played. Thereafter they dance to the sound of music alone, although this dancing is less vigorous than was that on the original occasion. Both gradation and transfer are thus simply accomplished.

An adult "claustrophobia" (fear of closed spaces) reported by Rivers, was traced to an early experience at the age of four years. The child, blocked in a narrow alleyway, closed by a door too high for him to open, was attacked and violently terrified by a noisy and apparently vicious dog. This was reinforced by his having been compelled, at the age of six years, to sleep in a box-bed, on the inner side, where he lay alongside his brother whose presence blocked the exit. He dared not reveal his fear of this semi-incarceration, and lay there in terror for hours. Thereafter, and up into adult life, any closed space aroused in him unreasonable and inexplicable fear, which was not, however, so intense as the fright experienced on the childhood occasion. The fear reaction thus becomes both graduated and transferred to new stimuli, which in certain ways resemble the older situation to which it was originally attached.

Another case, described by Jones, had an unreasonable fear of high places, especially if in company of a man. Inquiry revealed a series of frights in connection with high places, in early childhood. The child had been dangled over a high wall, head down, by a male teacher; had been held aloft over a barrel of water, in a threatening

way by a male visitor; had been compelled by his father to walk around the edge of a high parapet, while shaking with fright. Again, the fear response becomes both graduated and transferred.

A somewhat milder case was that of a four-year-old child [12] who was afraid to go alone down the flight of stairs leading from her schoolroom. "Her eyes looked panic stricken and she trembled. When asked what she was afraid of she pointed to the two spindles of the railing nearest the top post." She was unable to explain her fear in any adequate way; she was afraid only when going *down* the steps, not when coming up them; and for several weeks past she had come up and down without adult assistance, and with no trepidation.

Dr. Woolley, who describes the case, finally explained it to her own satisfaction through inquiry into the recent events in the child's life. A baby brother had been born to the child's mother, in a hospital which the child visited. Leading immediately from the mother's room was a flight of steps with banisters similar to those at the school. "On coming out of her mother's room, with her mind full of anxiety and distress about the problem of the arrival of the baby which she did not dare voice, the first object which met her gaze was the staircase with its short flight of steps at the top and the upright posts of the banister. . . . Finding herself again in a situation so similar to that identified with her repressed anxiety, suddenly and unaccountably to herself, gave rise to her experience of fear." Thus a detail of the earlier situation provoked the anxiety associated with that former occasion.

[12] Woolley, "Personality Studies of Three-year Olds," *Journal of Experimental Psychology*, December, 1922, p. 386.

Experiments on infants reported by Watson [13] showed that although these subjects displayed no fear of small animals (rabbits, kittens, dogs) in the beginning, such fears might easily be instituted. If at the moment the animal appeared a loud sound (native fear stimulus) was produced the child was frightened by the sound. Thereafter the child would often show fear of the small animal, or indeed of any object visually or tactually resembling it.

Rage likewise is capable of being attached now to one object, now to another, in an ever widening series. . . . An individual hampers the use of the child's arms and legs, constrains it, holds it badly when dressing it, . . . soon the mere sight of that individual arouses the rage components. Finally an entire stranger whose appearance is even slightly similar to that of the first individual may set off the responses.

Nearly two hundred years ago Edmund Burke called attention to this process, in his explanation of the effects of poetry in the arousal of feeling and emotion. He wrote:

Such words are in reality but mere sounds, but they are sounds which, being used on particular occasions, wherein we receive some good or suffer some evil, or see others affected with good or evil; or which we hear applied in such a variety of cases that we know readily by habit to what things they belong,—they produce in the mind, whenever they are afterwards mentioned, effects similar to those of their occasions.

The steps involved in this process of gradation and transfer may be analyzed in the following manner:

1. Original reactions are produced by total stimulat-

[13] Watson, "Studies in Infant Psychology," *The Scientific Monthly*, Dec., 1921.

ing situations, which have not been analyzed into their component details.

2. A partial detail of the stimulating situation tends thereafter to evoke a reaction similar to that made to the total situation, even when this detail occurs in new contexts.

3. This detail-evoked reaction is usually weaker than was the original response. It may also be briefer, less extensive, and in other ways different, but it has the same emotional quality or tone.

4. Details that have belonged to several antecedent situations will be followed by responses which vary somewhat according to the tendency of reinforcement or inhibition due to contextual details and circumstances, the recency of the various antecedent situations, their relative effectiveness, and similar factors.

5. Constellating details, that is, several details belonging to similar antecedent situations, will tend to reinforce one another, thus producing various intermediate degrees of reaction completeness, and effecting further gradations in the original "all-or-none" responsiveness.

If the effective detail was artifically *added to* the originally effective stimulus (as in the case of the furry animal and the fearful noise), we have a case commonly described as a "conditioned reaction." If the detail is some intrinsic component of the original situation which, as a whole, was responsible for the initial response, we have the immediate effectiveness of partial stimuli. In still another form, a weaker stimulus becomes effective in producing the reaction formerly made only to stimuli of greater intensity. The general term which we use for all these cases of substitution, partiality, or reduction of

stimuli, is "redintegration," that same fundamental mechanism of psychological development [14] which we have found explanatory in the case of voluntary control and the acquisition of meaning (in language and elsewhere).

From these simple beginnings of gradation, constellation, and transfer, evolves the complex emotional life of later years. Emotional and attitudinal reactions become infinitely elaborated, organized, differentiated, attached to remotely analogous objects and more abstract features, relations, situations. Attitudes thus build themselves up, in the more complex emotions and sentiments, about persons, acts, forms of play, occupation, customs, and institutions, duties, legal enactments, points of view, human relations, and even general philosophies of life. It has been suggested that childish resentment against a dominating parent may underlie temperamental radicalism and revolt against authoritarianism and established creed in political and social organization.

The tremendous rôle of extrinsic determination in the formation of these temperamental aspects of human personality is at any rate not to be overlooked. Whether the four primitive attitudes of resistance, content, startle, and gloom, elaborated into the emotions of anger, joy or love, fear, and sorrow, represent the sole intrinsic contributions, we do not know. That other native emotional patterns may mature later in the individual's growth is entirely possible. They should not be assumed, but only recognized, if at all, on the basis of observation and experiment.

Formal training and therapy or reconstruction may seek to modify these results of incidental gradation and trans-

[14] H. L. Hollingworth, *The Psychology of Functional Neuroses*, 1920, and *The Psychology of Thought*, 1926.

fer. Modern reëducation and psychotherapy consist in part of attempts at such emotional retraining. The effectiveness of various procedures seems to vary with the trainer, with the pupil or subject, with the prevailing beliefs, and perhaps also with the emotional pattern and the nature of its stimuli.

Punishment and suppression, elimination through disuse, adaptation through repeated contact, verbal instruction, substitution and deflection, distraction, social pressures, change of context and scene, variation in incentive, and the setting up of new modes of response to offset the old, promotion of understanding, replacement of emotional responses by responses of classification and cognitive interpretation, all these techniques, among others, have in some hands and on some occasions, therapeutic effectiveness. But the most wholesome preventive of faulty emotional twists is native intelligence and sagacity. Since these seem to be in the main intrinsically determined, the possibilities of "personality-building" in later life are distinctly limited.

From the point of view of mental hygiene the important thing to realize is that emotions, being modes of behavior, are susceptible of education in ways similar to those effective with other activities. Early emotional attitudes, becoming habits, and perhaps capable of evocation by situations only remotely analogous to those originally provoking them, may result in temperamental twists in later life, in sentimental, affective, and impulsive attractions or revulsions, dreads, or discomforts. Because of the obscurity of their origin, such personal idiosyncracies are often grouped with more strictly "native" tendencies under the designation "constitutional" traits.

Marston [15] has recently investigated, by experimental and rating scale methods, the emotional attitudes of children in the pre-school period. The traits looked for were the "introversion" and "extroversion" which have become popular psychological terms in recent years. The situations which were experimentally set these children were "social resistance to a stranger, compliance with a request that the child perform a difficult task, interest reactions to a varied and novel environment, and self assertion in response to the denial of his wishes." These situations were produced, in standardized form, for each child, and the mode of response carefully recorded, classified, and graded.

The results of the study of one hundred children between the ages of two and six years lead to the conclusion that "children long before the normal age of school entrance, even as young as two and three years, have already developed characteristic attitudes of introversion and extroversion toward certain significant situations." The study does not show whether these attitudes are to be interpreted as constitutional autonomic tendencies, or whether they are the product of life experiences. There is reason for believing that there must be a combination of original predisposition with extrinsic episode; the lighter the predisposition, the more impressive the required episode must be, or the more frequent its encounter, or the more numerous the contributory and reinforcing episodes must be.

[15] Marston, "The Emotions of Young Children," University of Iowa Studies in Child Welfare, III, No. 2 (1925).

DEFECTIVE DEVELOPMENT

The progress we have outlined in the foregoing account is applicable on the whole to the average or the normal child. But we have seen that even in physical measurements there is considerable variation about the average. The range from tallest to shortest infant at birth is at least 2 to 1, and the range for weight at least 3 to 1. In mental characteristics and psychological growth the range is still greater.

During these early years of infancy (as also in later years) children may vary from the average in two chief ways. They may, on the one hand, be *precocious,* and, at a given point, be very far ahead of the norm for their age. A given child may be capable, at the age of three, of those accomplishments that are characteristic of the average child at five. These deviations in the direction of superiority we shall postpone until they are encountered at a later developmental stage.

More striking to the popular mind, because fraught with such definite domestic, economic, and educational difficulty, is variation in the other direction, toward *mental deficiency* or inferiority.[16] Many individuals continue to develop physically, increasing in height, in weight, in muscular strength, in the definiteness of their instincts and emotions, with increasing age; though mentally, as shown by their capacities for understanding, learning, and the organization of the more complex action patterns, they remain backward. Even their physical development is likely to proceed at a slower than average developmental pace.

[16] L. S. Hollingworth, *The Psychology of Subnormal Children.*

The larger number of these backward cases develop beyond the limits of three-year mentality, and these we are not concerned with at this point. But a considerable number never grow mentally beyond the limits of this three-year period. These have been, in practise, recognized as a special group, because of their need for care, nursing, feeding, throughout their life. They may range in ultimate development anywhere from the birth capacity to that of the three-year level. Although there is of course no sharp dividing line between these low-grade cases and those just above them, those who in adult life fail to pass the three-year level are for convenience classified as *idiots*.

The idiot is then to be considered a more or less vegetative and animal-like organism, possessing perhaps the rudimentary capacities, but being helpless and unable to grow. When these very low degrees of mental development are present, there is likely also to be inferiority of physical development, perhaps less marked. Thus idiots as a class have more sensory and motor defects, they are frailer in physique, do not attain so great weight and stature, are organically weak and an easy prey to disease and accident. They tend on the whole to die at a relatively early age, although some, approaching the three-year level, live to be adults.

A familiar British definition of the idiot is "a person so deeply defective from birth or from an early age that he is unable to guard himself against common physical dangers." Obviously what is a common physical danger will depend on circumstances, whether the person is a savage or a civilized man, whether he lives in the city or the country, in the suburbs or the city streets. Hence

this definition, although it serves a rough practical purpose, is not a psychological description.

A definition proposed by French psychologists is based on the close relation between language and mental growth, which we have already noticed. "An idiot is one who never reaches the plane of spoken language; he is limited to the use and understanding of gesture." The complexity and continuity of linguistic development gives this definition also certain defects. Is the use of a vocabulary of ten rough vocalizations, including the names of a few objects, enough to take one out of this classification? Or can even the idiot develop to the point where "sentence words" are used? Or must one, not to be classed as an idiot, have a vocabulary of at least four hundred words? Such a border line or border area suffices to show the inexactness of this rough definition.

No more adequate is the legal definition suggested by Lord Coke, an ancient jurist, "An idiot or a born natural fool is one who from his nativity by perpetual infirmity is *non compos mentis.*" Blackstone's definition is but little better. "An idiot or born natural fool is one that hath no understanding from his nativity, and is therefore by law presumed never likely to attain any." For what is it to be *"non compos mentis"* or "without understanding"? We have seen that from birth an infant possesses a certain amount of organization, a certain adaptability, and that a certain *degree* of understanding early shows itself.

An old English law approaches somewhat nearer to an adequate definition when it states that "it is sufficient to find a person an idiot if he has not any use of reason; as if he cannot count 20 pence, or if he has not understanding to tell his age, or who is his father or mother." The

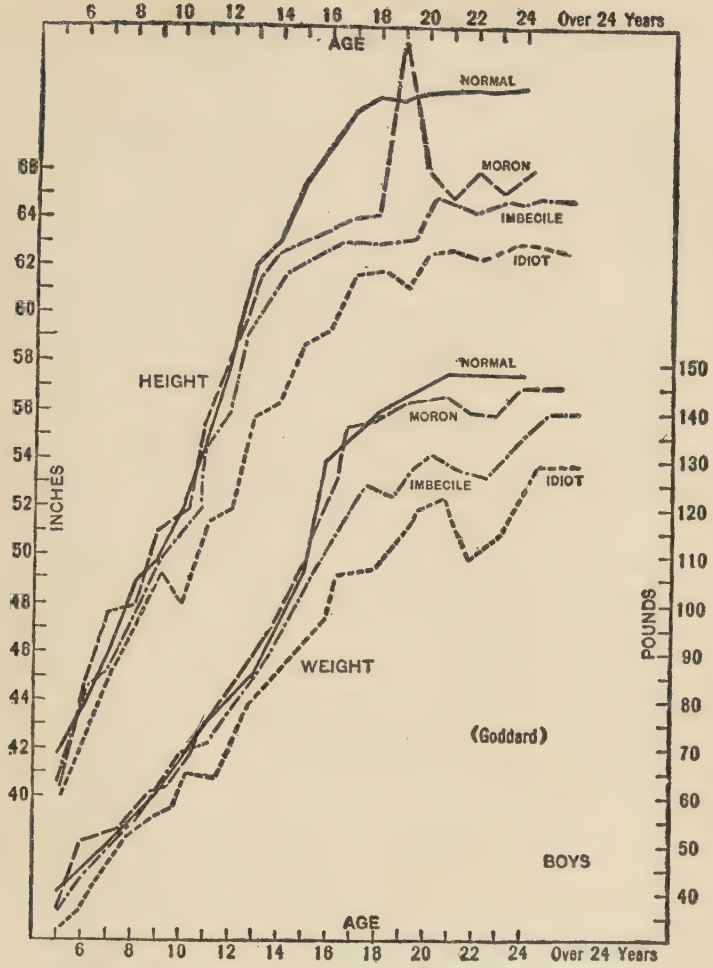

FIG. 9.—HEIGHT AND WEIGHT OF THE INTELLECTUALLY NORMAL AND THE VARIOUS DEGREES OF FEEBLE-MINDEDNESS.

Illustrating the rule of correlation—the intellectually inferior are also inferior in physique, and the greater the intellectual defect the more marked the physical inferiority. (From Goddard, as reported in *Journal of Nervous and Mental Diseases*, April, 1912.)

psychological definition accepts such suggestions. It discovers exactly what things can be achieved at a given stage of development by the average or normal individual. These tasks, when administered and interpreted in a standardized way, constitute *developmental norms* or *capacity tests.* On this basis it is customary to define an idiot as one who by original defect or early impairment is unable to grow beyond the achievements of the average third-year level of accomplishment. The precise nature of these standardized achievements is described in accounts of developmental norms and intelligence tests, some of which are here illustrated.

Thus in the early Goddard revision of the Binet-Simon tests, the three-year achievement consisted of the following:

1. Points to nose, eyes, mouth, when asked, "Show me your . . ."
2. Repeats a short sentence such as, "It rains; I am hungry."
3. Repeats, at dictation, two digits (memory span) such as "7-2."
4. Knows its name.
5. Enumerates at least three objects, seen in a picture.

In the Stanford Revision of this series, by Terman, certain other accomplishments are added, and minor changes made in those just given. Thus the three-year-old is expected also to know whether it is a boy or girl, and to be able to name three of five objects upon request (penny, closed knife, watch, key, pencil); and a memory span of three digits instead of the two of the earlier standard is prescribed.

Further three-year achievement standards are presented

by Gesell,[17] based on his study of fifty representative three-year-old children. The "normative summary" for this age may be given here, but the reader should consult Gesell's volume on *Mental Growth of the Pre-School Child* for many details and additional instructive comments.

NORMATIVE SUMMARY, THREE YEARS (GESELL)

Motor Characteristics
- Draws a circle from copy
- Draws a horizontal stroke imitatively
- Creases a piece of paper neatly
- Aligns a card to an edge

Language
- Uses pronouns, past and plural
- Names three objects in a picture
- Can tell simple stories
- Distinguishes prepositions, *in, under, behind*

Adaptive Behavior
- Builds bridge imitatively (with cubes)
- Builds block tower of four or more
- Discriminates between two short lines
- Combines two parts of severed picture

Personal-Social Behavior
- Can open door
- Can carry breakable object
- Asks questions of elders
- Puts on shoes

The following cases (from Goddard) [18] will illustrate the characteristics of the adult idiot. Of course the picture

[17] Gesell, *The Mental Growth of the Pre-School Child*, 1925. (Copyright, 1925, by the Macmillan Company. Reprinted by permission.)

[18] Goddard, *Feeblemindedness, Its Causes and Consequences.* (Copyright 1914, by the Macmillan Company. Quoted by permission.)

of juvenile idiocy will differ somewhat from that of adult idiocy, because of the longer years of life, the greater bodily development, and perhaps the maturing of such physiological functions as sex, and the acquisition of certain special habits and minor skills.

Male, age 16. Has a mentality of two years, and has been six years in the institution. Pleasant, smiling boy, cannot dress himself, rarely speaks, then only a few words. Drags his feet when he walks; destroys his clothing, and is in general low grade and undeveloped. After a year in school he had not learned a single letter, his only improvement being that he "could hold the chalk a little better." No physical stigmata of degeneration. Parents still expect him to improve and to be able to make a living. Father alcoholic, mother feeble-minded and sexually immoral; all mother's sisters and brothers are feeble-minded, as were their parents.

Female, age 20. Has been in institution 14 years. Has a mental age of one year. When admitted (at age of six) she could hardly walk, could not care for her own bodily needs, said only a few words, would play with her doll a little. Since, she has scarcely improved. Learned to string a few beads, and to say a few sentences. The attendants say she never sleeps; does not understand commands; eats garbage. Very little known of heredity or cause of her condition, which was congenital.

One of the useful things for human happiness, so far as the parents and children are concerned, is to recognize idiocy when it occurs. Instead of firmly trusting that the child will still develop if some special operation, or medicine, or mode of teaching is administered, it is far wiser, having been convinced that the state is that of idiocy, to turn the attention to teaching such habits of self-help as may make the individual the least possible burden

to those about him, or still better, in most cases, to place the individual in an institution where such cases are sheltered, nursed, and given such physical care as they demand. The development of sentiment about the vegetative idiot and its existence only befuddles human life and values, rather than ennobles them.

CHAPTER X

THE QUESTIONING AGE—THE IMBECILE HURDLE

THE PERIOD DESCRIBED

The developmental period from the third to the sixth year coincides with Kirkpatrick's "stage of individualization." It is defined especially by an extrinsic factor, the entrance upon school interests and activities. Up to this point the typical child has been more or less of a family pet, and has usually developed a strongly individualistic set of references, such as "my house," "my wagon," "my papa." From the point of view of the outside observer the age is characterized by its "selfishness," its noisy and "senseless" play, the eternal questioning, the absence of the standard adult criteria of truth and reality, and the strong tendency to "make-believe" and personification.

The advent of school days at the close of this period is a significant event. The individual passes from fireside to classroom; from family solicitude to the less personal ministrations of mental and social equals; and from the fond guidance of parents to the more objective direction of teachers. Strong demands are made upon the sense of self-hood, which has been evolving, upon the resources of independence and self-care, and upon the accumulated repertoire of motor coördinations, emotional attitudes, and the fund of meanings so closely linked with language.

At the close of this period, with the beginning of school activity, strong socializing influences begin to operate, which are of sufficient importance to constitute the beginning of a new stage in our developmental account.

PHYSICAL CHARACTERISTICS

At the age of five the average child (we refer throughout to American norms) is about forty inches in height and forty pounds in weight, and is growing at the rate of approximately two inches and four pounds each year. Sitting height is large, compared with standing height, the lower limbs growing in strength rather than in length. Boys are somewhat larger than girls, as they have been from birth. The period terminates between the ages of the two sets of teeth, the milk teeth are already developed, and are just on the point of beginning to loosen.

MENTAL ACHIEVEMENT

At the time of kindergarten entrance at the age of five or thereabouts, children presenting themselves at school will be likely to range from three to seven years in mental age. Thus in a typical selection of one hundred such children the intelligence quotients will range from about sixty to about one hundred and fifty, that is, from feeble-mindedness to unusual superiority. Approximately 50 per cent of them will fall between the limits of five and six years of mental age, with intelligence quotients ranging between ninety and one hundred and ten.

The range of capacities of the normal or typical five year-old is indicated with sufficient clearness for our pur-

pose in the "normative summary" for that age, as formulated by Gesell.[1] Some of these standard accomplishments are included also in the Stanford Revision of the Binet scale. In some cases the tasks or performances are sufficiently indicated by the words used to describe them, in the "normative summary." In other cases the use of special materials is involved. These materials and the precise methods of employing them are described in detail in Gesell's volume.

Combining these two sources of information (Terman and Gesell), the following statement may be made of the accomplishments to be expected of the five-year-old, of average mental development:

(*a*) *General Coördination and Motor Control.* To draw a prism and a triangle from copy; to put together two triangular cards so that they will look like a rectangular card that is shown ("patience"); to build a keystone arch with blocks; to lace its own shoes; to replace play material neatly in box; to "hook a fish" three times in one minute and to "complete four of eight forms" (these last two being special tests for which Gesell's book should be consulted).

(*b*) *General Social and Adaptive Conduct.* To put on hat and coat alone; to indicate correctly the prettier of two pictures; to state its own age correctly; to interpret humor; to speak with noninfantile articulation; to discriminate two weights.

(*c*) *Understanding and Use of Symbols.* To define words in terms of use; to know three or four words in the standard vocabulary list; to draw a recognizable man and tree; to perform three commissions given orally; to

[1] Gesell, *The Mental Growth of the Pre-School Child.*

name the four colors, red, green, blue, yellow; to use play material "with advanced constructiveness."

In these arrays of accomplishments, the various manual performances, under visual guidance, show the marked progress in motor control and coördination beyond those of the preceding developmental stage. The interpretation of humor, the satisfaction from constructive play, the neatness in disposition of materials, and the esthetic interpretation of the pictures, show how far the process of emotional gradation and transfer has gone. The elaboration of the system of symbols and meanings is clearly revealed in accurate articulation, in the use of words significantly, in the definitions of terms, the naming of colors, the report of the individual's age, and the understanding of oral instructions. These three great fields of accomplishment, action, emotion, and meaning, serve as convenient bases of classification for changes in development throughout the life span. They correspond to the doing, feeling, and thinking of the older days of psychology, and the distinction, though only one of convenience, has many advantages. They correspond also to the postural, autonomic, and cortical levels of description which we shall have occasion to employ at a later time.

COMMUNITY OF KNOWLEDGE

The work of the school years will be largely directed toward the introduction of the individual to a standardized body of information, practise, and technique, which the experience of the race has adjudged necessary for its future welfare. Up to this time the socialization of the human being, aside from his family contacts, has been

very incidentally conducted. He moves, to be sure, in a world of objects and events which seem to the adult to be well defined and discriminated, with established relations. But much of this world, accessible as it is, has not yet impressed the five-year-old with its systematic character. He lives more or less in a world of his own selection, and, as we shall see, in large part of his own fancy.

When Stanley Hall [2] reported, in the early years of the child study movement, that 53 per cent of Boston children had never seen a sunset, 50 per cent had not seen clouds, 25 per cent had never seen a shoemaker at work, 22 per cent did not know their right from their left hand, and 21 per cent did not know where milk comes from, instructive light was thrown on the obliviousness of the human infant to many things that must be constantly in his field of view. Many of Hall's more striking results (93 per cent had not seen growing wheat, 80 per cent had not seen a beehive) may be explained by actual lack of encounter; other amusing results clearly came from unfamiliarity with words. But, as Norsworthy and Whitley write, "a very large number are due to simple lack of seeing, hearing and feeling accurately and with attention the things that are in his daily life."

An interesting measure of the community of reference and associative context is afforded by the studies of free association in children of different ages. Thus Rosanoff [3] reports the number of common responses (given by some one else in one thousand subjects) and individual re-

[2] Hall, *Aspects of Child Life and Education.*

[3] Rosanoff and Rosanoff, "A Study of Association in Children," Psychological Bulletin, XX, No. 1, January, 1913, pp. 43-89.

sponses (peculiar to the individual) to a series of simple stimulus words, presented with the instruction to tell the very next word that came to mind. White children of five years gave only 57 per cent of common responses, negro

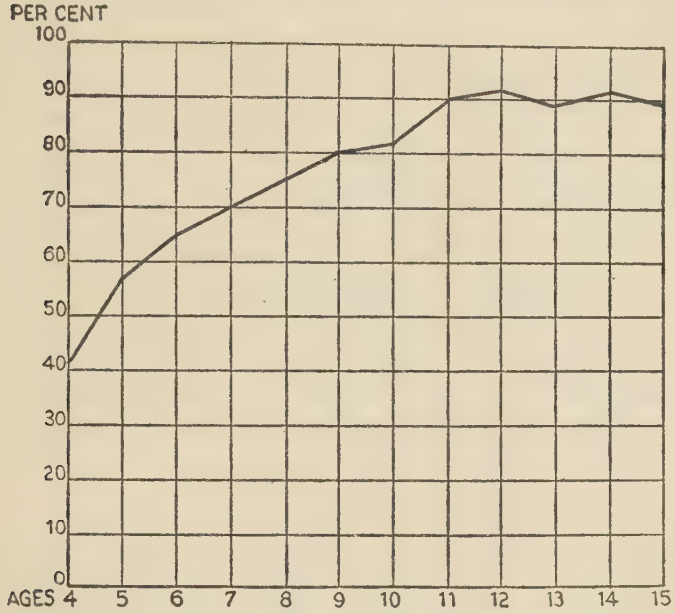

FIG. 10.—INCREASE, WITH AGE, OF PER CENT OF "COMMON RESPONSES" IN FREE ASSOCIATION TESTS.

Increasing community of ideas is supposed to represent growing determination of thought by the objective relations of the common environment. (From Rosanoff and Rosanoff, Psychological Bulletin, January, 1913.)

children only 43 per cent. By the age of eleven years, however, the per cent of common responses has risen to 89 for white and 82 for negro children, and it is not likely to go above 90 per cent even in the case of adults.

This means that the familiar connections of things, of

ideas, and of words, determined by their experienced relationships in daily life, are far from realized or acquired at this age. Common responses, in this test, may be taken as indicating the degree to which the course of verbal associations is determined by familiar objective experiences, rather than by individual interests, and local or personal experiences.

These characteristics are in keeping with the indisposition of the five-year-old to lend himself persistently to adult purposes and goals. He is a creature of whim and fleeting fancy, easily distracted from the present activity or task, and even more prone than adults to offer "irrelevant" answers to questions, or to indulge in disconcerting by-play. It is not that this age is wanting in purpose and goal ideas. It is full of purposes, but the goals are characteristically individual, fugitive, and habits of attention have not yet been bent under the yoke of duty and labor.

REASONING AND PROBLEM SOLUTION

But the establishment of goals and controls and the organization of materials and evidence about the problems encountered, are well under way. All the characteristics of advanced modes of reasoning may be observed in the activities of five-year-olds, but in naïve form and in mild degrees. Relations are apprehended between the events of life, and many of them are given verbal expression. Belief and doubt are both present, although the "primitive credulity" of children is astonishing. Inductions and deductions are made from facts of original observation, although the immature criteria of validity fail to guarantee that conclusions will meet with adult sanction.

As in the case of primitive magic, analogies prevail and fallacies are overlooked, because of inadequate counteracting information. Thus the mouths of plants will be sought for, and pennies may be planted in hope of a larger harvest. Furniture may be spanked because of its obstinacy, and prolonged conversations are held with toys and pictures. Causal efficacy is assigned to incidental bits of a ceremony, and a visit to the wash basin serves as adequate surrogate for a thorough scrubbing. But problems are felt, manipulations are undertaken, generalizations are made, assertions are repudiated, discriminations are abundant, and an apparent attitude of curiosity and inquiry is one of the most conspicuous features of the period. The five-year-old is "out to learn," and one of his favorite instruments is the interrogation of his seniors.[4]

QUESTIONS AND THEIR MOTIVES

A mother, an older daughter, and a youngster in the questioning age passed through University Hall, by a door through which the college crew could be seen, exercising on the rowing machines. Hearing the strange noises they peeked in, looked for a moment, then went on. By one behind them the following fragments of conversation were to be heard:

What were they doing, mother? They were rowing.

What is rowing, mother? Rowing is making a boat go in water.

[4] More detailed accounts of the development of thinking in children will be found in Norsworthy and Whitley, *Psychology of Childhood*, chaps. vi-x; Buehler, *Die Geistige Entwicklung des Kindes*, chap. vii (68 pp.); Stern, *Psychology of Early Childhood*, Part VIII.

But they didn't have any boat, did they? No, they had something like a boat.

A boat has to go in water, doesn't it? Of course, of course!

But they didn't have any water. How could it go then? It didn't go, they just pulled as if it went.

But they didn't have any water. Did they pull in the water? No! No! Do be still! They didn't have any water.

Well, sister, how could they row if they didn't have any water? Oh, they just had things to pull on, sort of.

At this point the group turned the corner in another direction, and the remaining questions were not audible. But it was fairly clear that either the inquiring mind was to be left baffled, or the elders were going to become annoyed and rough, or else that the elders were going to prove unusually patient and discerning. From the beginning that was overheard, it is probable that the five-year-old curiosity was to be nipped in the bud.

The queries of this period have become a subject of common jest, and have even penetrated into advertising copy. It is a period full of Why? Where? Who? How? What? When? Kirkpatrick [5] reports the following array of questions asked by a child about a passing airship.

How high will it go? Will it come near the sky? How big is it? Where does the man stay that makes it go? What kind of an engine does it have? How big is it? Where does he get gasoline? Does he have a tank? How much gas does the air-ship hold? What is it made of? When does he get his money? Would he give us some?

[5] Kirkpatrick, *The Individual in the Making*, p. 161. (Copyright 1911, by E. A. Kirkpatrick. Quoted by permission.)

Would he make a ship for us if we paid him? How much does he pay his men for making his air-ship? How much does it cost? How many can ride in it? Does one go up and stay, and then another one? Is it dark up there?

Among the apparent motives for this eternal interrogation the following provide at least a partial excuse for the adult annoyance occasioned by it.

(*a*) Genuine curiosity, of the same kind that keeps men of science just as constantly asking questions of one another and of natural phenomena. Through vicarious experience and verbal replies the range of knowledge is expanded.

(*b*) Desire to check up the child's own generalizations by the approval of one better informed. As we shall see later, there is a growing distrust of personal observation; it so often goes astray in childhood that there may well arise a general suspicion of all personal conclusions until they are confirmed by others.

(*c*) Much of the questioning seems to be merely a means of getting and holding the attention of others. Stating a fact does not have the same attention compelling power as does asking a question. Just as adults often ask questions in order to keep conversation going, children and salesmen learn the attention value of a question.

CHILDHOOD LIES AND MAKE-BELIEVE

A visitor commented on the picture of a kitten, hanging on the wall in Helen's home. Before her mother appeared, Helen had told an engaging story of this kitten, which she said her mother had when she was a little girl. She kept it for a long time and then it died, and her mama

had the picture taken so she could always have it. On another occasion the same child informed her small friends in the neighborhood that Wednesday was to be her birthday, and that she was to have them all come to a party at her house, where they were preparing ice cream, cake, and strawberries to eat before they went to the park to play with their dolls.

The adult visitor was as much surprised at the mother's denial of the kitten story as was the mother by the inquiries from her neighbors concerning the time at which their children were expected to appear. Both "stories" were fictions, although they no doubt had a pleasing ring to the young narrator, and expressed desires which only such tales could satisfy at the moment.

Norsworthy and Whitley [6] describe a little girl who when shopping with her mother broke out into violent crying and could not be comforted. Finally it was discovered that her mother had sat upon a chair by the counter, upon which this child's "imaginary companion" was supposed to have been sitting, and that this companion must surely have been killed.

More than one parent has been surprised to find that the children preferred a broken furniture crate to the elaborate and expensive playhouse that had been bought or made for their pastime. The clothespin doll holds its own with the more exquisitely clad and rosily tinted store product. In a few seconds the five-year-old can assemble a "menagerie," if sticks and stones are lying about the premises, and an overturned kitchen chair becomes in turn and with bewildering rapidity a jail, a hospital, a battleship, or a postoffice. Much of the play of this

[6] Norsworthy and Whitley, *The Psychology of Childhood*, p. 163.

period is play in the sense of pretense or make-believe; it is playing *at* rather than *with* things.

The explanation lies in part in the fact that play is what the individual is *doing,* not what the world of things determines. If small and manageable toys are available, to duplicate objects in miniature, they are readily employed. But outer semblance is a poor substitute for inner reality. The individual at this period is so engrossed in his own activities that the paraphernalia and trappings are a minor matter.

In part also this ready make-believe and personification arise from the inadequate distinctions made between the world of "objective reality," the world supported by social consensus, and the world of "appearance," of individual experience. This is a distinction that is just dawning in the five-year mind. It is impeded by the practise of telling children tales, without taking the precaution to distinguish between "true stories" and "play stories."

On this childish (and adult) tendency to confuse fact with fancy Thorndike[7] writes: "The necessities of guiding our lives by realities rather than by our imaginations finally bring most of us to a clean-cut separation of our percepts from our images. We know well enough whether we really made a fortune last week or only fancied it in a daydream. . . . But children of 3 to 6 years, and even of school age, live much in semi-dreams, in which the imaginations of play, the memories of the past and actual facts are often hopelessly confused."

Stevenson, in his essay on Children's Play, wrote, of this childhood trait: "One thing, at least, comes very clearly out of these considerations—that whatever we are

[7] Thorndike, *Notes on Child Study.*

to expect at the hands of children, it should not be any peddling exactitude about matters of fact. They walk in a vain show, and among mists and rainbows; they are passionate after dreams and unconcerned about realities; speech is a difficult art, not wholly learned; and there is nothing in their own tastes or purposes to teach them what we mean by abstract truthfulness."

In addition to these frailties of mental make-up, the small child has the same motives as adults for malingering, capitalization of minor disabilities, and prevarication, and the same unreliable machinery of recall. Consider the adult inclination to "make a good story" out of a trivial occurrence, and to elaborate it by additions, substitutions, and more exciting details. Consider the adult difficulty of distinguishing between things actually lived through and things reported by others.

Aside from the utilitarian use of lies, resentment is one of their commonest motives, both in children and in adults. A negative attitude toward another person leads to resistance and to unwitting untruthfulness, as an expression of this resistance. A full-grown college professor was once asked by an annoying graduate student whether he had read her examination book yet. Without delay and with emphasis he replied "No!" Yet at that very moment the examination paper, duly read and graded several days before, lay on his desk. It is clear that a negative reaction toward another person may lead to the negation of anything agreeable to that person, just as it leads to disbelief in his assertions. These tendencies are not acquired after childhood; instead they survive from that period. Sulkiness and obstinacy may also be grounded in the simpler motives of dislike.

The mental hygiene of childhood demands truth and frankness, even at the cost of adult embarrassment. When mother is found to have told false tales about "Santa Claus," "the stork," and "the bad man," the awakened distrust spreads to mother's other statements. One of the sources of stress in adolescence comes from the difficulty of not rejecting *everything* when the sham and treachery of *some things* are exposed. These difficulties begin early in childhood.

The distinction between objective and subjective worlds is one slowly arrived at, and one readily shed, even by adults. We constantly appeal to others for verification of our own observations; we enjoy acting, seeing, and reading the drama in its literary form, because we so easily identify ourselves and others with these fictions and characters; in our daydreams and our night dreams the distinction between fact and fancy is very tenuous; many of our memories we cannot guarantee; in the laboratory, even under experimental conditions, we mistake our images for outer objects, and outer objects for images; and in the megalomania and delusion of mental disturbance this tendency reverts to its more guileless and uncontroverted infantile form.

The petty lies and confabulations of childhood, the ready confusion of fact and fancy, the easy dramatization and personification, are in the typical case free from malice and iniquity. They reveal how long and hard a road we have to travel before we may hope, in maturity, to have clear distinctions between the true and the false, the actual and the imagined. Even in the more august sciences, no sooner is a concept "invented" than it becomes "postulated," and then described as a "reality," "force,"

or "substance." The power of symbols lies in the fact that we come to react to them in some sense as we would to things. The lies and make-believe of childhood are no more abundant and no more malicious than are the fictions of social intercourse and the chapters of adult science.

THE DREAMS OF CHILDREN

Freud has observed that in the case of children, at all events before their fourth year or so of life, the dream always expresses, in an obvious and undistorted form, an unfulfilled and conscious wish of recent experience. Only with older people, he maintains, on whom the necessity of suppression falls, does the dream assume a disguise and express a deep-seated, obscure and often inarticulate craving. The following two dreams of children, cited by Freud, may be quoted in this connection.

a. A boy of 22 months is to present a basket of cherries as a birthday gift. He plainly does so unwillingly, although they promise him that he will get some of them himself. The next morning he relates his dream,—"Hermann eat all cherries."

b. A little girl of three and a quarter years makes her first trip across a lake. At the landing she does not want to leave the boat, and cries bitterly. The time of the trip seems to her to have passed entirely too rapidly. The next morning she says,—"Last night I rode on the lake."

The doctrine of wish-fulfilment should not be uncritically adopted. The following five-year-old dream, reported by Gesell, is not to be so naïvely explained:

"Do you know what I dreamed about last night? An elephant sailed in a sailboat and banged it and had no more trunk and blood all came out of the big hole."

The point is that just as childish memories are faulty in their backward reference, and purposes are unstable in their forward tendencies, so the general activities of childhood, in play, in fancy, and in dream, are closely related to events of the present. The organization of the self into an extended temporal system, reaching into the remote past and into the distant future, is as yet only in its initial stages.

STANDARDS OF BEHAVIOR

From the point of view of rules of conduct, moral ideas, and concepts, and similar constraints, this period of childhood is a nonmoral and preparatory stage. During it the habit-formation, the imitation, the specific inhibitions imposed by adults and playmates, and by natural consequences, lay the foundations for the later acquisition of "principles" of conduct. At this age right and wrong are what is or is not permitted. The "nature and quality of the act" are at least only vaguely understood. These involve a perception of human relationships which are for the most part beyond the five-year knowledge or understanding.

The specificity of habit is the principle of conduct control at this age. Any suggested act is likely to be carried out, if it promises excitement, except in so far as it is specifically associated with penalty or memory of disapproval. Even at a relatively late stage of development this is still the fact, and many adults understand the wrong to be that which is contrary to commandments or laws. The beginning of ideals as controls can be seen in childhood in the use of such terms as "papa's boy," "a little man," "a tomboy." Many bits of behavior are discour-

aged or promoted by the application of such terms of vague approval or disapproval.

Gradually common elements are discerned among the various things that "papa does not like" or that "mama will spank for." As this occurs, new acts may be classified in these categories, and moral perception is under way, in the act of classification. Perhaps only superior adults and unusually intelligent children ever advance far beyond this level of moral control.

General attitudes formed or encouraged during these days may persist as character dispositions, or may occasion person difficulties in later relearning and readjustment, as in adolescence and youth. The ensuing period of socialization and school life often serves as a partial corrective of such inclinations.

Expectation of dominating a scene, vanity and jealousy reactions, kindness and generosity, stubbornness and cruelty, seeking power through tantrums, fears of numerous kinds, habits of retaliation, dependence on others for personal services, peevishness and petulance, food idiosyncracies, table manners, habits of sleeping and of speaking, degree of excretory control, all these illustrate the hundreds of traits that are dependent on extrinsic determination in the pre-school years. Their laws are the ordinary rules of learning and habit formation, chiefly the laws of exercise and effect.[8]

THE COURSE OF EMOTIONAL TRANSITION

More or less maudlin narratives of child development, in recent years, have attributed the shift of emotions and

[8] Useful collateral reading at this point will be found in Groves, *Personality and Social Adjustment*, 1924. See also Morgan, *The Unadjusted School Child.*

preoccupations to stages in the expression of some inner urge or libido. Thus Freud [9] and others insist that the sex interests and emotions of youth go through a typical series of stages, which they appear to attribute to some inner compulsion, and which they suppose to be especially characteristic of sex interests. The fact is, instead, that these changes are intimately related to the changes in environmental opportunity and adult supervision. They are extrinsically rather than intrinsically determined, and they are no more characteristic of sex emotions than they are of such activities as anger, play, and the like.

Thus Freud supposes that there are three important "developmental periods" in sex interests. There is he says, an early infantile preoccupation with nutritive processes, with the sense organs, with the sensitive zones of the body, with the mother's breast, an "unorganized and polymorphous perverse" period, in which interest is primarily centered on the individual's own sensory experience.

Around the fifth year is supposed to begin a period of "sexual latency" in which personal stimulation and autoerotic interests give way to preoccupation with the give and take of caress between child and parent or nurse. Shame develops and sex emotion becomes centered about the person of others, especially of those resembling the individual.

Later on, in puberty, sex satisfactions become restricted to particular sensory regions, cravings become more specific; the aim becomes more ultimate, rather than anticipatory, and interests shift toward extrafamilial love ob-

[9] A convenient summary of Freud's account will be found in *Manual of Psychiatry*, by Rosanoff, *et al.*

jects, until in the healthy course of development a suitable life mate is found. The shift is thus described as being from an auto-erotic, through narcissistic and homosexual periods, to a final hetero-sexual adjustment. Perversions and abnormal attitudes arise from fixation or arrest on one of these levels, or from relapse to them in later life, or from faulty direction of the tendencies during their early stages.

In order properly to appreciate this account of the "development of sex motives" we should at once observe the characteristic course of progress in the case of other activities, such as anger or play. Consider first the case of anger and rage reactions. It is not strange that the first rage reactions should be provoked by bodily restraint, interfering clothing, and interference with movement. These early rage reactions involve the whole organism in "polymorphous perverse" fashion. Neither the sense organ, nor the specific motor apparatus, nor the final rage objects are yet determined, and the period may be suggestively called a period of "auto-rage" activity.

"At about five years" the rage reactions undergo a period of latency. Anger is now more specifically directed toward parent, nurse, and other family members; the primacy of the fists and the teeth is under way, and feelings of shame are attached to anger outbursts, leading to such fixation tendencies as those shown in sulking, tantrums, and the like. But it is clear that this stage is not determined by any inner law of "anger libido"; instead it is dependent upon the increasing motor activity of the child and the circumstances and personnel of his environment.

Later on, "about the time of puberty," rage impulses

become more specific; they are directed, in school and playground, upon the extrafamilial associates, rather than exclusively upon father and mother. Because of parental management the first playmates are likely to be those of the same sex, and in early years segregation of sexes in school activities and play is not uncommon. The rage reactions of the child thus pass from an auto-ragic stage through narcissistic, homo-, and finally hetero-type interests. Arrest or fixation on any of these levels may of course yield a personality with chronic animosities and perverted anger impulses.

Play activities follow the same course, which is determined by the individual's attainment of motor maturity and the limits of freedom permitted by parents. The first auto-playful period is one of random manipulation of fingers, toes, arms, limb, and head, the biting of fists, the pulling of blankets, the gurgling of food. At about five the play objects extend out into the limits of the house and yard, since ability to walk and talk now permits this. Pulling father's whiskers, tearing sister's dress, manipulating the door bell, scratching the piano, teasing the dog, and other diverse play activities show that the auto-playful period has given way to a period of "play latency" in which the objects are essentially other little children of the same age, or familial personages and the restricted environment of local objects. By puberty the playmates cease to be sister, parent, and neighborhood child. The individual is allowed to consort with extrafamilial personages, especially with those of the same sex, mode of dress, age, and motor capacity. Finally playful enterprises are likely to be more restricted to the recreation and entertainment of prospective or actual life mates.

Arrest on any of these levels, and perverse return to them in dotage, constitute interesting deviations in the course of the play impulse.

All the mechanisms of sublimation, fixation, compensation, are as characteristic of anger and play as they are of sex interests. Baseball inclinations may be worked off on the lawn mower; general noisy vitality takes the form of boy scout leadership; adult play is often only a relaxation of the ordinary restraints and inhibitions. Anger may be worked off, sublimated, or compensated by daydreaming, by vigorously sawing wood, by playing the piano, or by shadow-boxing.

The point is, essentially, that the exaggerated accounts of the course of sex development are unjustified. These stages do not represent any inner law of unfolding of predetermined forces or urges, nor are the stages peculiar to one or other set of emotions. From the earliest steps in gradation and transfer to the later crystallization of sentiments about objects, activities, and institutions, the technique is preëminently that of extrinsic determination, playing upon a limited and individually varied repertoire of primitive attitudes. That the process is complex and the incidence of the influential factors often obscure, there can of course be no doubt. But this is no excuse for an animistic account of the course of emotional transition.

DEFECTIVE DEVELOPMENT

Defective development, in the form of faulty education and training, may occur in so many ways throughout this period that no summary account of its devious modes can be attempted. Every sound principle of education and of

character formation can be effectively applied throughout the pre-school age, as well as later in the classroom. Special developmental dangers in connection with emotional and attitudinal reactions and fixations will be more carefully considered in connection with the following developmental period. But the findings are no less applicable to this earlier stage.

Since intellectual growth beyond this stage is so essential for adequate participation in social and economic life, and for the establishment and maintenance of healthy family activities, the fairly large number of individuals who never pass beyond this level constitute a serious social problem. It is this fact which leads us to designate this developmental stage as the "imbecile hurdle."

As we have seen, a few individuals never develop mentally beyond the three-year level, and are called idiots. A considerably larger number pass the three-year level, move well up into the region between the three- and seven-year levels, but fail to grow further. These we call *imbeciles*. Bearing in mind the foregoing description of the five-year-old child, with his narrow understanding, his limited capacity for knowledge, his unsocialized tendencies, his individualistic impulses, his lack of criteria of truth and error, the limits of his ability to take and maintain a given direction or goal, the specific character of his conduct controls, and his general lack of moral perception, we have already a fairly clear picture of the mind of the imbecile.[10]

We should add, however, that in physique, and in the more primitive impulses and instincts, such as sex and

[10] For further details see Goddard, *Feeblemindedness*, and L. S. Hollingworth, *Psychology of Subnormal Children*.

anger, he is likely to be more mature than in intellect and control. He will be able to protect himself from common dangers, but he will himself represent only an added danger to his family, his associates, and to the community, unless special care is taken. Especially under the suggestion and provocation of vicious companions, he may be led to commit acts of whose "nature and quality" he has no adequate conception, and which to maturer minds are loathsome and repugnant.

On the basis of language development the imbecile has been described as one who "understands spoken language and talks himself in varying degrees of fluency, but cannot learn to read and write." In terms of intelligence measures he is defined as one whose mental age, at its maximum development, will lie somewhere between the limits of three and seven years. For practical pictures of the imbecile level of development the following cases (from Goddard) may suffice.

IMBECILES [11]

Woman, aged 25. Has been in institution 18 years. Admitted at 6, there was nothing peculiar about her except that she was decidedly backward and helpless. Speech defective, could not dress or undress herself, did not know the alphabet, was fond of music. Was placed in kindergarten class where she did simple exercises well. Gradually fell behind the class. Not until she was 12 was she able to dress and undress herself. Could count to eight at that age, and could sing a little with others. Was nervous and fidgety. Since then there has been little change. She gradually gave up school work and was put at industrial work, where she has learned to make beds and to help in general housework.

[11] Goddard, *Feeblemindedness.* (Copyright, 1914, by the Macmillan Company. Adapted by permission.)

Talks a great deal, foolishly and simply. Gets very silly over visitors who admire her curls. Is cheerful, affectionate, truthful, obedient and good tempered. Is small and light. Takes her 90 seconds to do the Seguin form board, meanwhile making many absurd mistakes. Her mental age is 4 years.

Mother in institution for feeble-minded; aunt keeper of a disreputable house and has an illegitimate daughter; mother's uncle was insane and her cousin is sexually immoral and criminalistic and is now in a penal institution.

Man, aged 34. Has mental age of 6 years. At 10, when admitted, speech was defective, memory poor, could not dress himself, was unclean, dangerous with fire, brutal, vulgar, profane and difficult to manage. Has improved under institution discipline and is now strong and healthy and a good worker in the institution, driving coal teams. Has quarrelsome, cranky spells, is somewhat sober, willing and tries to help, and usually obedient. But he is not truthful or honest, is quick tempered and forgetful.

Father and two uncles feeble-minded. One of his mother's brothers was also feeble-minded and had several feeble-minded grandchildren. Grandmother was feeble-minded. Cousin is also feeble-minded and in the same institution.

WILLIE METCALF [12]

I was Willie Metcalf.
They used to call me "Doctor Meyers"
Because, they said, I look like him.
And he was my father, according to Jack McGuire.
I lived in the livery stable,
Sleeping on the floor
Side by side with Roger Baughman's bulldog,
Or sometimes in a stall.
I could crawl between the legs of the wildest horses
Without getting kicked—we knew each other.

[12] From Masters, *The Spoon River Anthology*, p. 214. (Copyright, 1915, by the Macmillan Company. Reprinted by permission.)

On spring days I tramped through the country
To get the feeling, which I sometimes lost,
That I was not a separate thing from the earth.
I used to lose myself, as if in sleep,
By lying with eyes half-open in the woods,
Sometimes I talked with animals—even toads and snakes—
Anything that had an eye to look into.
Once I saw a stone in the sunshine
Trying to turn into jelly.
In April days in this cemetery
The dead people gathered all about me,
And grew still, like a congregation in silent prayer.
I never knew whether I was a part of earth
With flowers growing in me, or whether I walked—
Now I know.

SUPERIOR DEVELOPMENT [13]

Matching these cases of inferior development will be found such instances as the following, deviating in the direction of superiority.

A girl of about 8 years. Mental age, 15 years (I.Q. 188). Physically sound, never seriously ill. Height, weight, grip, and lung capacity distinctly above the norms for her age. Parents are above average intelligence,—mother has considerable musical ability also, and father is a physician of repute.

Has a vocabulary of 13,000 words (characteristic of college freshmen). Memory span of 9 digits forward and of 7 reversed. In Army Beta (non-verbal) tests achieves a 14-year rating. Makes scores of 9 to 10 year accomplishment on construction tests. Rates about 5th grade ability in arithmetic tests; 8th grade in handwriting, grammar, and spelling; 11th grade in reading. Information in zoölogy and physiology better than second term High School level. In tests of poetic appreciation, as good as college sophomores.

[13] Much abbreviated, from a detailed account by Terman and Fenton in *Journal of Applied Psychology*, 1921, pp. 163-178.

Has only moderate interest in childish plays. Ambition is to be physician and writer. At age of 5, read books by Charles Lamb and George Eliot. By 8th year had read about 700 books, some of them twice. Favorite authors include Shakespeare, Eliot, Dickens, Thackeray, Wordsworth, Hugo, and the like.

Before 3rd year she made up stories and composed rhymes. At 6 years began to use typewriter and "was soon launched on her literary career." By 8th year had written more than 100 poems and 75 stories,—"enough to fill a volume of 200 or 250 pages."

Her best poems (written, it will be remembered, before the age of 8 years) compare favorably with published poems by college students (Stanford University volume used in test rating). Her prose compositions are equally remarkable. She often illustrates her poems and stories with crayon and pencil drawings, in which she "gives evidence of considerable talent."

In recent years much attention has been given to the study of such exceptionally able children. Interesting material resulting from such investigation is to be found in the volume by Terman on *Genetic Studies of Genius,* and that by L. S. Hollingworth on *Gifted Children.*

SYNTHESIS

The characteristics of the period we have just described comprise a consistent picture. The narrow range of capacity and information, the limits of language and understanding, lead toward a constant effort toward self-expansion. The self as a center of reference comes to be appreciated and named, and to constitute a dominant interest. The plays are a testing out of one's powers, an enjoyment and assertion of them. The questions are but a further evidence of this endeavor of incomplete knowl-

edge to complete or extend itself. Life is full of gaps and riddles, and the experimental play, the exploring curiosity, and the interrogation all help to fill these gaps and solve these riddles. Thoughts and impulses otherwise thwarted by lack of knowledge are thus made to move more smoothly.

But since images are vivid and the self not yet clearly delimited, the tendency to incorporate other persons and things, to live one's self into them, to see how they feel and to act as they act, all these again represent the growing expansion of the active self as a center of reference. The dramatization and the fiction naturally develop since there are few controls, checks, or inhibitions imposed by the conditions of life as a protected and cared-for infant. Just as the adult indulges in phantasy in which the self is more fully expanded and desires granted, so does the child of five. But the latter can persevere in it without overt clash with his environment.

The life of the community as such is not yet possible, and will not be until a higher mental level and a more abstract self ideal are accomplished. Team plays do not thrive in this period. Other individuals are too interesting as objects of imitation and exploration. A strong sense of personal property rapidly develops, and toys and other play objects must be, at least for the play period, individually controlled. Plays are largely individual and solitary, and are likely to be noisy and active, and to have a senseless character, except when they assume the form of pretense and make-believe. Even then attention is flighty and continued play themes are the exception, unless guided by older hands.

The moral sense, as present, is mainly a set of specific

inhibitions, rules in the making, or rudimentary ideals, which relate to a limited array of concrete acts, rather than to the nature and quality of acts as such. Community of knowledge is extremely limited, and socialization is just on the point of a formal beginning. This task the school undertakes at the termination of the period. Under modern conditions of life the opportunity for free activity and outdoor enterprise on the part of children is so limited, especially in urban centers, that the period of school entrance is being pushed forward, as by the formation of nursery schools.

CHAPTER XI

THE "BIG INJUN" AGE—THE MORON HURDLE

POINTING OF DEVELOPMENTAL STAGES

Characteristic of the successive developmental periods of human life is a feature which we may describe as the temporal reference or "pointing" of the principal activities of the period. At birth this pointing is clearly backward, into the past. The infant activities betray no special concern with present or future events. Instead, by their nature and pattern they point backward to the phylogeny of the race; they betray the ancestry of the human stock, and the evolutionary course which has been "telescoped" in individual embryology.

In the immediately ensuing stages attention is chiefly if not entirely preoccupied with present stimuli and events; present pains, caresses, and objects are the sole sources of interest and emotion; current episodes determine the direction of activity and the individual's endeavors and satisfactions. At the age of eleven or twelve years the typical care-free attitude of childhood is still apparent; retrospect does not reach far back into the past nor ambition far into the future. Yesterday, to-day, and to-morrow, or at most last Christmas and next Christmas, bound that specious present to which aims and regrets are limited.

In adolescence and the following few years, life is amazingly prospective and anticipatory in its reference. The

sense of past inferiorities and humiliations may be heavy, and strenuous efforts are directed toward the reshaping on the self and of the world in terms of ends remotely in the future. The choice of life mates, the selection of vocations, education and training for future activities may be so absorbing as to involve the sacrifice of present comfort and current playfulness. With the arrival at maturity the dominance of prospective reference subsides, ambitions are relinquished or satisfied, and another period of preoccupation with the present sets in. The rower rests on his oars and allows the currents into which he has forced himself to bear him on their way; or having discovered his limitations, he satisfies himself with the activities of the day, within the range thus imposed.

With old age reminiscence tends to prevail. Past successes loom large, the old times and the memory of them compensate for the relinquishment of future accomplishments. This course of temporal reference may be graphically illustrated by the pointing of an arrow, which turns twice, first forward, then backward, through the arc of a half circle. Perhaps the delineation we have given is somewhat forced upon the facts; it may be admitted that the undifferentiated period of infancy points forward to future diversities; that even in maturity and dotage the concern for "the life everlasting" weighs heavily with many mortals; that pride in and solicitude for grandchildren has forward racial reference even in the last days of life. Nevertheless the enumeration of things that are "most important" and of motives that are most dynamic in the succeeding epochs of life shows that underneath all these apparent contradictions the general shifts of temporal reference are maintained in something like

that sequence which the picture of the arrows suggests. Failure to perform these shifts characterizes many forms of human abnormality and perversity. The shifts are determined both by the waxing and waning of intrinsic factors, and by the play of extrinsic events.

Developmental shift of interests in subjects and in activities is in many cases explained by the relation of the matters in question to the momentary pointing of the particular stage. Thus much of the juvenile interest in swimming, wrestling, and boxing; much of the adolescent preoccupation with physical culture, cultivation of grace, manners, and eloquence, pursuit of a certain vague "nature cult," relate especially to the preparation of the individual for fancied future emergencies. Adult males, on the other hand, often comment on their loss of enthusiasm for swimming, for boxing, for camping, and may wonder to what profound inner change this loss of zeal is due.

In such cases it is commonly true that the youthful interests were not intrinsic; they were not directly in these acts themselves, but in a realization of their possible bearing on future demands. Swimming, boxing, calisthenics were rehearsed so that the individual could be a noble lifesaver, could protect the weak, or could handle other vaguely predicted emergencies. With the advent of maturity it is realized that the chances of shipwreck, personal combat, and arctic exploration are infinitesimal. Hardening exercises lose their prospective reference, and their zeal. The adult is more absorbed in past athletic exploits, or in such acts as have an immediate pleasure tone than he is in the preparation of the self for the rôle of the hero. The reformer loses zeal as the end of the world approaches.

THE SIXTH DEVELOPMENTAL CROSS SECTION

Exercising that arbitrariness which we have seen to be unavoidable, since development is continuous, we may direct our next account to that period which represents the last years before the beginning of pubescence is noticeably manifested, the years from ten to twelve. In several ways this period is a favorable one for summarizing the results of previous growth. The bodily signs of approaching sex maturity are not yet conspicuous, nor is the individual deeply concerned with those human activities which these changes herald. Intellectually many forms of dexterity approach their maximum at this time; processes of sensory discrimination, immediate memory, retention span, sensori-motor reaction times, and the like change little if any, as the result of increasing age, after this period.

Sheer learning through associative connection, and the various performances involved in verbal intelligence tasks, show a developmental curve that distinctly begins to flatten out at this period. Great numbers of individuals reach their maximum mental growth by this time or earlier. They comprise that large class of human beings who, because of the numerous social, economic, and education problems to which they give rise, have been given the name "morons" by students of defective development. This age is therefore the "moron hurdle," the significance of which we shall consider at a later time.

Conventionally, in American schools, this is the age of the sixth grade. This educational attainment, until recently, at least, represented the average achievement of our population. This stage therefore represents the time at which differentiation begins between those capable of

pursuing the abstract and symbolic forms of "higher education" and those best served by the more direct and concrete modes of manual and industrial preparation. The inability of many to follow this period with the successful

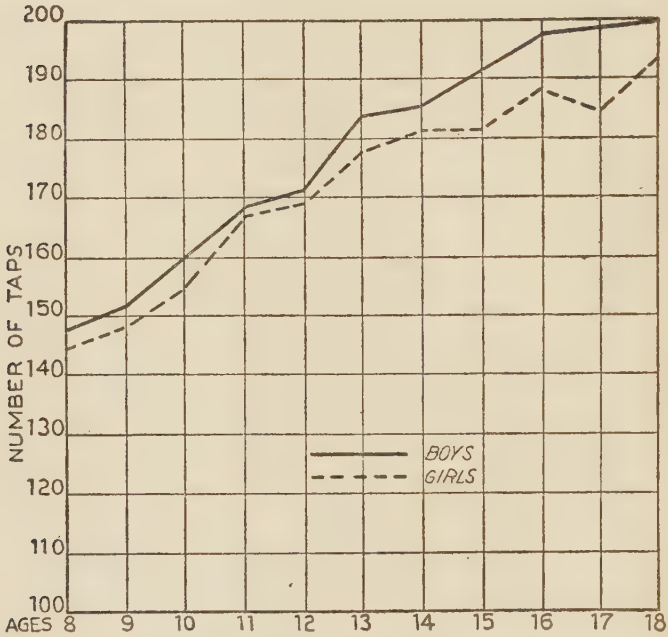

FIG. 11.—CHANGE IN RATE OF TAPPING, WITH INCREASING AGE.

The score is the number of taps per minute with the right hand. The data are from records on 395 boys and 495 girls, by Smedley.

pursuit of "high school" activities, with their typical college-preparatory content, has led in recent years to the organization of "junior high schools," which lead more consistently toward education for character, citizenship, and vocation.

At the age of ten boys are still somewhat taller and heavier than girls, on the average. In the case of girls the physiological and structural changes of puberty often

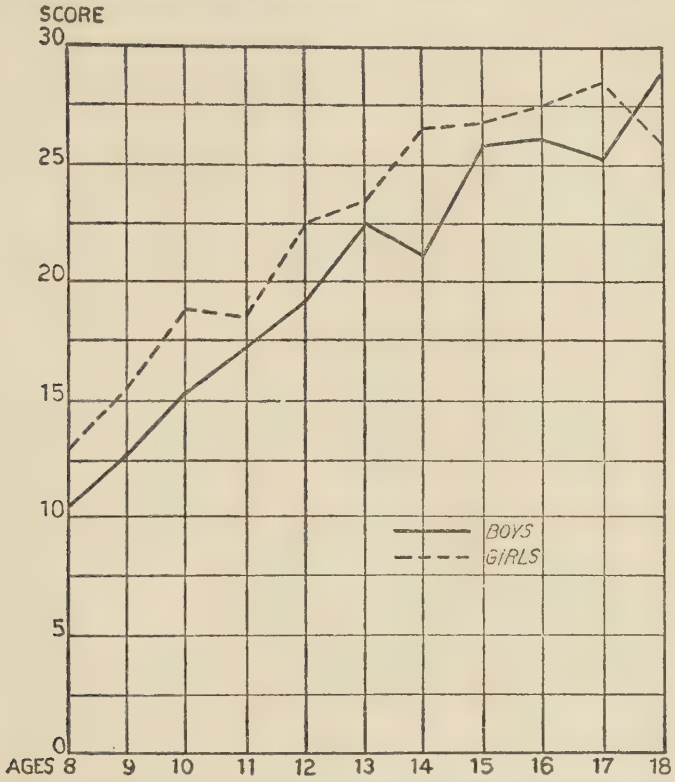

FIG. 12.—SCORES IN A SUBSTITUTION-LEARNING TEST (DIGIT-SYMBOL) BY THOSE OF DIFFERENT AGES.

(From Pyle, *The Examination of School Children.*)

become manifest by the eleventh or the twelfth year, and in the majority they will appear within the next couple of years or so. With these changes comes an acceleration,

both of height and weight, but especially of the former, so that girls by the eleventh or twelfth year overtake boys in these respects. There is just beginning, therefore, that interesting social and psychological shift or displacement of friendships and playmate attachments, which, later reinforced by numerous extrinsic influences, will lead to the association of boys now in this sixth developmental stage with girls who at the same time are in that "questioning stage" which we have considered in the foregoing chapter.

Hall,[1] writing with his well-known enthusiasm for the significance of special developmental periods, attributes unique importance to this "big Injun" or "pygmoid" stage. Thus he says:

> The years from about eight to twelve constitute a unique period of human life. The acute stage of teething is passing, the brain has acquired nearly its adult size and weight, health is almost at its best, activity is greater and more varied than it ever was or ever will be again, and there is peculiar endurance, vitality and resistance to fatigue. The child develops a life of its own outside the home circle, and its natural interests are never so independent of adult influence. Perception is very acute and there is great immunity to exposure, danger, accident, as well as temptation. Reason, true morality, religion, sympathy, love, and esthetic enjoyment are but very slightly developed.

INTELLIGENCE STATUS

Some notion of the general range of intellectual accomplishment, of the sort measured by available scales, may be secured by contrasting the typical ten-year tests with the typical twelve-year tests on the Stanford-Binet [2] scale.

[1] Hall, *Youth*, pp. 1*ff*.

[2] Terman. *The Measurement of Intelligence.*

The comprehension of the ten-year-old enables him to give reasonably sensible replies to such questions as, "What ought you to do before beginning something very important?" "Why should we judge a person more by his actions than by his words?" But the twelve-year level is required before there is sufficient ability to make abstract comparisons and generalizations such as are needed to give adequate common-sense definitions of the terms "Pity," "Revenge," "Charity," "Justice." We may expect the eleven-year-old to show a practical sense of fitness in simple social situations, but not to be able to guide his conduct in terms of very definite verbally expressed notions of human rights. Such ideas as those of ownership, fairness, law, and justice will be rudimentary and not very powerful, as ideas, in the control of conduct.

The ten-year-level individual can detect the obvious absurdities in such statements as: "An engineer said that the more cars he had on his train the faster he could go"; "A man said he knew a road from his house to the city that was down hill all the way to the city and down hill all the way back home." But the twelve-year level is required to give the point of such simple fables as that of "The Fox and Crow," "The Milkmaid and her Plans," in reply to the question, "What lesson does this teach us?" To interpret these fables, to say what they teach us, requires a degree of appreciation and inference that aptly discloses the individual's rational insight into social relationships and moral principles.

The ten-year-old can score eight memories from the content of a simple newspaper paragraph, once read; has a memory span of six digits, spoken in the forward order; and can repeat from memory (after one hearing) a sen-

tence of from twenty to twenty-two syllables. But to devise a "superior plan" of searching for a ball lost in a field, to construct sentences out of a standardized set of disarranged words, and to repeat from memory, after one hearing, five digits in the reversed order of their presentation, requires the twelve-year level.

The ten-year average individual is still likely to be limited to "description" or "enumeration" when confronted with standard pictures and asked to "tell about them" or to report "what you see"; by the twelve-year level these modes give way to the tendency to "interpretation" of what is presented. The ten-year level characteristically gives thirty definitions in the standard word list, the twelve-year level gives forty; the estimated vocabulary of the average ten-year-old is thus 5,400 words, that of the twelve-year-old being 7,200.

The ten-year level is typically unable to state the similarities between the following sets of items, although the twelve-year-old typically discerns the common elements:

snake, cow, sparrow
rose, potato, tree
book, teacher, newspaper
wool, cotton, leather

Interesting age comparisons have been revealed in the study by Georgina S. Gates,[3] of the "social intelligence" of children, as shown by their accuracy in interpreting the expressive reactions of others, on the basis of photographic portrayal of facial expressions. Pictures selected on the basis of adult judgments, were chosen for various moods

[3] Gates, "An Experimental Study of the Growth of Social Perception," *Journal of Educational Psychology*, 1923, pp. 449-461.

and emotions which might be reflected in facial expression. Children of different ages were tested for their ability to recognize these facial signs of the emotional attitudes of others. The importance of this capacity for the social interpretation of signs is apparent.

The approximate ages at which the various typical reactions were correctly interpreted by at least three-fourths of the children investigated, were as follows:

Amusement, Laughter, Glee.....by the age of 3 or 4 years
Anger, Rage, Pain, Suffering.....by the age of 6 or 7 years
Fear, Terror, Horror.....by the age of 8 years
Defiance.....by the age of 10 years
Pity or Sympathy, and Scorn.....by the age of 11 years
Surprise, Amazement.....by the age of 12 years
Wonder, Admiration, Suspicion.....by adults only

The individual child can obviously be given an "interpretation score," depending on the number of these facial expressions he correctly interprets. Such scores were compared by Dr. Gates with various estimates of the characteristics of the children studied. She writes:

It seems that we might group these estimates in three classes, two of which are merely judgments of Physical and Mental Maturity as these concepts are frequently defined; the third includes capacities which are neither strictly physical nor strictly mental. This third group includes Social Maturity, which is an ability to coöperate with, to get along with one's fellows and superiors, to show the most approved forms of gregariousness, self-assertion, and submission; Scholastic Maturity, which is mainly a temperamental capacity, an eagerness to learn and an ability to stick to a problem or project, a blend of curiosity and aggressive reactions to things; and Emotional Maturity, which is the ability to control one's emotions. . . .

Correlations of the interpretation scores with these various estimates were found as follows:

With Chronological Age	+.31
With Mental Age	+.12
Estimated Physical Maturity	+.26
Estimated Mental Maturity	+.22
Ability to Coöperate	+.42
Ability to Handle Projects	+.60
Control of Emotional Reactions	+.50

Since the correlations of the interpretation scores are considerably higher with the last three "social" traits than with the first four "maturity" traits, the author suggests the tentative conclusions "that ability to interpret the facial expressions of others (as measured by this test) [4] is, with these young children, a factor in social coöperation, in demonstrated eagerness for, and continued interest in projects, and in desirable emotional control." She suggests that "the present test is not merely another measure of chronological or mental age, but gauges, in some measure, traits more definitely social in character."

GENERAL BEHAVIOR CHARACTERISTICS

Kirkpatrick's [5] designation of this prepubescent stage as one of "competitive socialization" aptly sums up many of the behavior traits of the period, and also shows the great rôle played by extrinsic or environmental circumstances. "The sharp corners of individuality are to a considerable extent rubbed off or suppressed and the in-

[4] Gates, "A Preliminary Study of a Test for Social Perception," *Journal of Educational Psychology*, October, 1925, p. 452.

[5] Kirkpatrick, *The Individual in the Making.*

dividual is made to conform to the rule of social life." Physical attainment of capacity for self-care and orienta-

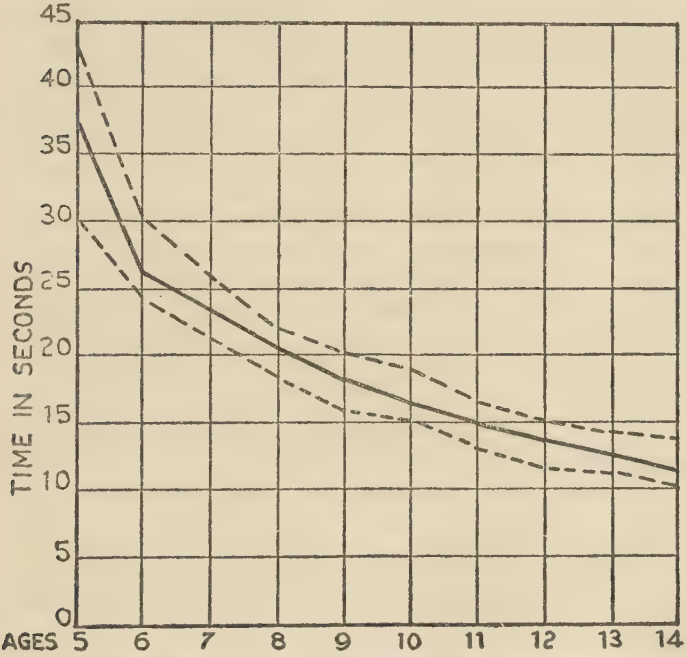

FIG. 13.—TIME REQUIRED AT DIFFERENT AGES TO PERFORM THE SYLVESTER FORM BOARD TEST—A TASK NOT INVOLVING THE USE OF LANGUAGE.

The middle line shows the averages for each age. The other lines show the limits between which fall 50 per cent of the cases at a given age. (From Sylvester, "The Form Board Test," Psychological Monograph, No. 65, as adapted by Pintner and Patterson, *A Scale of Performance Tests*, p. 104.)

tion leads to greater freedom from adult supervision. Boys and girls are released into larger fields, they roam farther from home, they have many hours of leisure, they encounter others of their own status, and begin a sort

of tribal life of their own, wherever conditions of life favor this.

Scorned by the older adolescents, with their growing love interests; and in turn scorning the juveniles who are still in the care of nurse or under the watchful eye of the elders, or are physically unable to partake in the "freer life" of sport, they exploit such opportunities as the environment affords. The distinct modes of dress, of deportment, and of early playthings, all foisted upon the young by the supervision of the elders, now lead to a fairly distinct cleavage between the two sex groups. Boys flock together, in their gangs, clubs, and teams. Girls play together at their parties, and do the best they can, under the more watchful concern of the elders for their innocence and "femininity." Antagonisms often spring up between the two groups, and such active relations as are established are likely to be in the way of teasing, bantering, and jealous competition.

Social pressures which seek to establish sex-determined standards are strong at this age, and ideals of conduct for the two groups are clearly motivated by the realization of the possible dangers of faulty habits, premature sex activities, and the fact that such activities commonly have more overt consequences to girls than to boys. That these motives are not articulate in those who foster the respective "ladylike" and "manly" ideals may well be, but it is biological consequence that forms the basis for the long recognized "double standard" of morals, and this double standard begins to assert itself even earlier than these days of free play activity.

The plays of the free eleven-year-old are strongly social, in the sense that they involve many players. Elements of

individual competition are strong; organized team play is often attempted, probably on the basis of imitation and adult suggestion, but such efforts commonly degenerate into "all-star" performances. There is lively individual competition, which tends to be discouraged or given less overt forms in the usual supervision of girls. Boys freely compete in speed, strength, endurance, fortitude, courage, and cleverness. In their free masonry loose organizations also spring up, in competition with other loosely formed groups, these being the much discussed gangs of small town and city life.

In imitation of elders, or under influence of the literature commonly provided for juveniles, these groups may assume bizarre forms of organization, with codes, rules of honor, secret places of resort, vaguely defined "aims" and loyalties, and a modest accumulation of group property and paraphernalia.

Under the influence of suggestion and coercion the game activities of girls are given a more domestic turn; they are thoughtfully provided with dolls and needle baskets, rather than with bow-and-arrow and carpenter outfits. Individual inclinations to depart from type are strongly disapproved, first by the elders, then by associates of both sexes. The "tomboy" on the one hand and the "sissy" on the other become common terms of social manipulation.

Speed, strength, and accuracy feature prominently in the earlier days. Concern over ease, form, and grace is delayed. These are less exciting, less adventurous, less animated. Under social pressure again, girls are deflected toward the latter three, while boys are encouraged in their pursuit of the first three. The personal recognition of

probable future demands, as it begins to develop, probably conspires with these social pressures.

The livelier modes of intellectual play also become prominent at this stage; guessing games, games of chance,

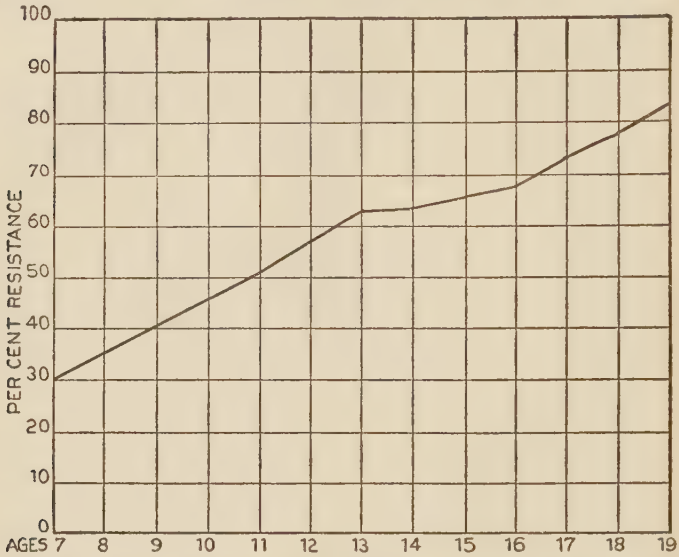

FIG. 14.—ABILITY OR TENDENCY TO RESIST SUGGESTIVE SUGGESTIONS, AS A FUNCTION OF INCREASING AGE.

The data are a combination for Forms A and B of the Otis Suggestibility Test. (Margaret Otis, "A Study of Suggestibility in Children," Archives of Psychology, Columbia University, No. 70, 1924.)

and the literature of action, adventure, and mystery are commonly preferred. Advanced degrees of mental development may assert themselves in a notable way at this stage. Such advanced intellectual growth often leads to a lack of interest in the "silly" activities of playmates, to a bent for reading, a curiosity over matters of history, sci-

ence, and art, and often to efforts to make individual talents count through the writing of tales, the devotion to music, versifying, drawing, or mechanical constructiveness.

Various characteristics often described as peculiarly belonging to this developmental stage are prominent only because of the freedom allowed their expression by the demands of life, and because of the conventional application, at this time, of social pressures. Thus gang formation is no less characteristic of adolescence or maturity than of the "big Injun" age. But whereas before this age physical maturity and common familial supervision have not made such flocking together possible, after this age the demands of labor, industry, and domestic responsibility interfere with it.

Collecting is an activity often ascribed especially to this period. It is clear that only by this time is that freedom of action and movement attained which permits such roving and acquisition as collection of nests, birds' eggs, and the like involve. And later on, in the passion for accumulating real estate, engravings, bank accounts, antiques, and in the longing for an abundant posterity, the collecting activity persists. Its prominence at this stage, the various forms it assumes, and the fugitive nature of the interests in special objects, are not due to the mysterious unfolding of a "collecting instinct," heretofore latent. Instead they are the product on the one hand of physical growth and intellectual liveliness, and on the other of conventions of supervision and adult encouragement.

The pranks and escapades of this period, the various common forms of delinquency, the "little savage" acts of

theft, marauding, bullying, vary also with social circumstances. That they are more commonly attributed to boys is a result of such a circumstance. That curiosities, not appeased by frank adult information, lead to "immoral" inquisitiveness, to "obscene" interests, and to "delinquent" acts, is no sign of intrinsic perversity. Bearing in mind the mental immaturity which is shown in the typical disability even to name the common features of "snakes, cows, and sparrows," the failure of children to grasp the conventional categories of ethics should not be surprising.

Misunderstandings between adults and children of the "big Injun" stage are commonly due to that failure of adult understanding which on one day exacts of the child a matured insight and responsibility, and the next day insists upon its "babyhood." Principles of conduct must still be specific, and the relation of one proscribed act to another, while it may be emotionally appreciated, is yet often not capable of articulation as a rule of action. The noisiness and "wildness" of the romps of this period are best understood by those adult proclivities which come to the surface in festivals, initiations, baseball games, and on those rare occasions when grown-ups are enabled to indulge in "larks," free from ordinary constraints and inhibitions. The adult, when slightly intoxicated, reveals that the "big Injun" of his boyhood has only been temporarily overlaid by controls and constraints which the imbibed poison paralyzes.

Belief in luck, in magic ceremonies, in superstitions, are often cited as characteristic of these juvenile days. They could scarcely have developed earlier, when language was still in the making and most events were dictated by

parental supervision. Nor do they abruptly cease with maturity. They persist through life in the "half-educated" adult; they are perpetuated in many institutions and ceremonials. It is probably safe to say that fully

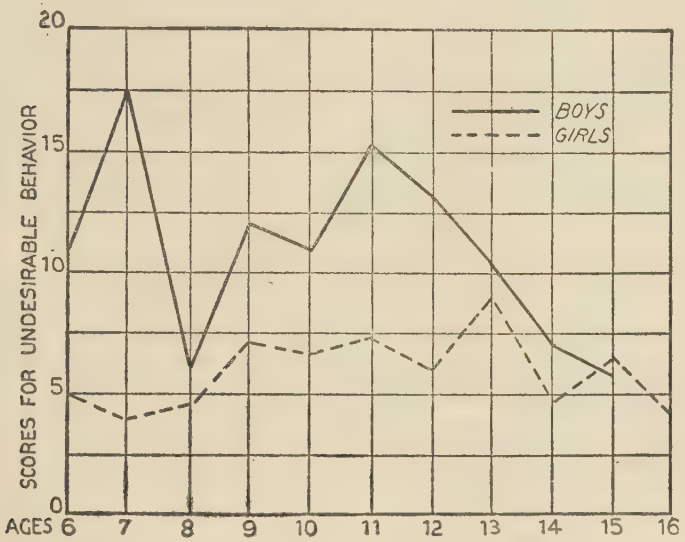

FIG. 15.—VARIATION OF UNDESIRABLE SCHOOL BEHAVIOR WITH INCREASING AGE, IN BOYS AND GIRLS.

The scores represent points systematically recorded, on the basis of gravity and frequency of the behavior, in the case of 800 school children, rated by their teachers. The higher the score, the more unsatisfactory is the behavior. (From Haggerty, "Incidence of Undesirable Behavior in School Children," *Journal of Educational Research*, September, 1925.)

three-fourths of the human race never recover from those attitudes and interests that have often been mysteriously attributed to the "big Injun" stage.

The doctrine of "recapitulation" has been sometimes used to show that this period is actually the telescoping of

a "primitive pygmy" stage in human evolution. Thus Hall writes:

> Everything, in short, suggests that this period (from 8 to 12) may represent in the individual what was once for a very protracted and relatively stationary period an age of maturity in the remote ancestors of our race, when the young of our species, who were perhaps pygmoid, shifted for themselves independently of further parental aid. The qualities developed during pre-adolescence are, in the history of the race, far older than hereditary traits of the body and mind which develop later and which may be compared to a new and higher story built upon our primal nature.[6]

We have not yet taken occasion to consider this "recapitulatory" account of the course of human development. The activities of this period have been so often exploited in favor of this doctrine that we may to advantage take this occasion to inquire into the nature and merits of its developmental theory.

THE DOCTRINE OF RECAPITULATION

This doctrine, as applied to mental development, was essentially an extension, by analogy, of certain observations in the field of embryology. Its widespread affirmation, and its influence, in the past, on educational philosophy, in spite of its various fallacies, perhaps may be explained by its intriguing picture of human growth. We may best consider the theory by first noting the embryological data on the basis of which the analogy was formulated; then citing examples of the application of it to mental development; then pointing out its fallacies.

[6] Hall, *Youth*, pp. 1*ff*.

The embryological facts we have already given in the chapter on heredity. In its embryological stages the human individual manifests, in succession, various appearances which resemble the embryos of more and more complicated organisms. It has been supposed that this series of resemblances results not from any greater economy or naturalness in the production of different forms, but that the phylogenetic stages of development are in a sense lived through and passed by the higher forms in the embryologic stages of growth. This has been expressed succinctly in Haeckel's formula: "Ontogeny repeats phylogeny." Numerous vestigial organs, which fail to undergo maximum development in human anatomy, are further supposed to reveal the necessity of the organism's going through the stages represented by other forms in whose lives such structures served a useful function. That the principle, as applied to embryology alone, has many complicating aspects, is true, but for our purpose we may consider what would be the case even if the principle were clearly applicable to the period of fœtal development.

With these observations as a basis, the doctrine of recapitulation has been applied to human mental growth in two quite different ways. Very often the distinction between these two modes is not recognized, and neither is distinguished from the original facts of embryology. Sometimes it is suggested that "therefore" human behavior must also show this recapitulatory phenomenon, and in the acts of infants and children have been sought counterparts of the activities of lower species, as if, having once recapitulated these forms in the days before birth, the individual must now *once more* recapitulate them in postnatal days. Thus instinctive "swimming movements"

and "climbing proclivities" have been sought for, to represent the typical activities of primitive aquatic and arboreal forebears. Since, in embryological development man has reached his distinctively human frame by the time of birth, the search was, on purely logical grounds, absurd, and the failure to find adequate infantile parallels is not surprising.

In its second form the doctrine has been that whereas in embryology man recapitulates the phylogenetic series, therefore in subsequent development he recapitulates "human history." Search for an orderly "unfolding of instincts," for a recapitulatory sequence of play activities, and for serial development of typical interests and fears, has been undertaken to support this conception. Very often the two conceptions are completely confused or combined, as may be illustrated in the following description from Stern.[7]

The human individual in the first month of his life is a "suckling" whose lower senses predominate. He enjoys but a dull instinctive and reflexive existence on the mammalian level.

In the second half year, however, the infant has attained a stage of development like that of the highest mammals,—the apes—furnished as he is now with the capacity of grasping, and also with a versatility in imitation.

But he does not become a man until his second year when he has acquired an upright posture, and the ability to speak.

During the next five years of play and dream-life he is at the level of primitive peoples.

Then follows entrance into schools, and a closer articulation with the social group, together with the imposition of definite

[7] Stern, *Person und Sache*, pp. 299-300. (Quoted by Koffka, *The Growth of the Mind.*)

obligations, involving a sharp distinction between work and leisure—all of which constitutes an ontogenetic parallel to the introduction of man into a civilized state with its political and economic organization.

In the first years of school age the simple situations of antiquity and of the Old Testament are most adequate to the youthful mind.

The middle years bring with them the enthusiastic features of Christian civilization, while at puberty he attains for the first time the mental differentiation which corresponds to present day civilization.

The *naïveté* of such analogies is clearly shown in the following conclusions of Norsworthy and Whitley:[8]

An eleven year old boy enjoys the water like a mud-turtle, scampers on the rocks like a goat, climbs trees like a chimpanzee, inhabits caves like a prehistoric man, builds wigwams or snow forts like a savage, parades with drum and fife like a twentieth century militant. He may practice with bows and arrows or water-pistols; he may model a water wheel, mix concrete, or even set up a wireless outfit. Which stage can he be said to be duplicating? Is he kid, monkey, barbarian, or plain boy? Moreover, love of the water and of climbing hills is found in the twenties and forties as well as in early years, facts difficult to reconcile with the recapitulation theory, as is also the lack of correspondence in the race and in the individual of the relative time of appearance of grasping, talking, and the sex instinct.

We have therefore three statements which must be distinguished in any account of the "recapitulation" doctrine. These are:

(*a*) That in human embryology there is something like a recapitulation of the phyletic stages, whereby the human

[8] Norsworthy and Whitley, *The Psychology of Childhood*, p. 37.

embryo "resembles" the *embryos* of successively more complex forms. Even if this were incontestably true, such recapitulation is completed at birth or before, and there is no reason suggested why it should have to be repeated during infancy in the form of activities.

(*b*) That the activities of childhood recapitulate the typical activities of the adult members of earlier forms, presumably its remote forebears. There is no logical ground for expecting this to be the case, and the observed facts fail to support the assertion.

(*c*) That the developmental stages of the individual's activities recapitulate the history of human beings, from their first distinctively human conduct to the most recent civilized modes of life. Again, there is nothing to support this assertion but the embryological analogy and certain "developmental analogies." On the other hand, numerous observations definitely contradict the assertion in the form in which it is made.

These "developmental analogies" are worthy of further consideration. They may throw light both on the origin of the recapitulation doctrine, and also on some of the general features of development.[9] Is it not possible that in any developmental process there may be discerned certain general tendencies or economical procedures, as the result of which certain developmental laws may be suggested, which have no bearing whatever upon the supposed inner necessity of recapitulation?

In an eastern college there has developed an annual feature known as "Greek Games." In early days wrestling and tug-of-war were the chief features, accompanied by competition in epic poetry. Action was unorganized and costumes were ordinary gymnasium apparel. Later in-

[9] See also Koffka's discussion of "parallels in developmental history" in his *The Growth of the Mind*, pp. 42-48.

terest grew in the game aspect, Greek costumes were adopted, a combined chorus and dance was introduced, and lyrics replaced the crude and lengthy epic poems. In these activities the college classes competed. The entrances were still organized competitive performances without a theme or story. Then the entrances began to take shape around a story, the costumes were elaborated, and the dance came to lay stress upon the features of grace and beauty. Professional judges of music, costume, and events were added. Then the competitive element ceased to be the dominating feature, although its continued presence was always provocative of enthusiasm and spirit. In this way, from a beginning as a sort of athletic carnival, the "Greek Games" have grown to be, in the words of the college paper "an esthetic and intellectual festival, unique of its kind, with the place of honor in tradition."

Now bear in mind that in the play activities of the period we are just discussing, we have noted a gradual shift. Plays are first individualistic exhibitions of strength and speed. Later they include interest in elements of form and grace. Still later in adolescence, play will be typically organized, with sacrifice of individual glory for the "good of the team," intellectual elements will become more prominent, and finally the great "play of man" will be in the fine arts, in poetry, drama, architecture, music, the whole field of esthetic enjoyment.

A "developmental analogy" is at once apparent between the change of play interests in youth and the course of modification of "Greek Games" in the college described. Is this because a new institution must "recapitulate" the plays of childhood, by a law of inner compulsion? Or is it because beginnings are simple and rough, and progress

is by the addition of refinements, complications, and details of finish and execution, no matter what be the object or institution that is developing?

Or consider the parallel between the development of graphic and other language in the race and in the individual. The earliest written language seems to have been the representative drawing of objects or situations. This gave place to the pictograph form in which sketchy outlines containing significant or suggestive features were substituted. Still later developed the rebus form of communication, elements of the pictograph being combined in new patterns to give new meanings. Then these diagrams degenerated into conventional signs, some of which, by contiguity association, became selected as standing for certain speech sounds. Then other signs were devised for other speech sounds, and finally evolved the typical alphabet of writing. Still later come substitutes in the way of abbreviation, shorthand, and other codes.

In the individual much the same history goes on. Pantomime, imitative gesture, and understanding of pictures represent the idiot plane of language. On the imbecile plane spoken language develops. Only with the moron stage do we find a reasonable ability to understand and use, in a simple way, written and printed language, the symbols of which are evolved on the basis of contiguity rather than that of similarity.

In both cases, the racial development and the individual progress, there is a shift from the general to the particular, from the representative to other forms of symbolism, from association through similarity to association through contiguity. Shall we say therefore that one development "recapitulates" the other? And if so, which

one does the recapitulating? Does the historic development duplicate the individual growth, or vice versa?

The fact is that the individual does not go through his characteristic course of development *because* the race or institution did, but instead, *for the same reason,* namely because of the limitations of skill, intelligence, and knowledge. We have here, as in the case of the analogy between Greek Games and the play activities of childhood, nothing more than *certain correspondences* and numerous deviations. Herbert Spencer was fond of pointing out such correspondences between the most surprisingly diverse sets of phenomena. But correspondence or similarity is very far from meaning recapitulation. The latter implies some causal and necessary relationship; the former reports only an observed resemblance.

If analogies are used only as a means of illustrating principles, or as a clue to the search for more general underlying common laws, they need not lead astray. But the formulation of "culture epochs" in human growth and the adaptation of training, school curriculum, and general activity to such a preordained scheme to which the recapitulation doctrine led, represent only a misuse of analogy and a false interpretation of development.

THE ONLY CHILD

In connection with early influences at the time of birth some attention was given to birth order. Certain developmental influences originating in part in the individual's family status are of interest in this period of late childhood also. Reports by certain psychiatric writers have often asserted that only children and favorite children are

more than proportionately encountered among the neurotic, the emotionally unstable, and among cases of habit distortion and perversion.

Brill [10] attributes these maladjustments of instinct and emotion to excessive parental attachment; he supposes that the child's organic and affective satisfactions become unduly systematized about the parents, through their tenderness and exclusive caresses, and that this prevents the normal shift of interest to extrafamilial objects and persons, leads to abnormal erotic reactions, and interferes with normal hetero-sexual interests and adjustments.

Psychiatric reports are likely to represent undue clinical generalization, through the fact that only abnormal cases are likely to come to clinical attention. That an undue proportion of only children should arrive at such clinics may well enough follow only from the greater solicitude of parents over the health and future of only children. Slighter deviations might serve to bring such cases to the psychiatrist than in the case of children of larger families. We require similar data on only children not coming to clinics or to psychiatrists before it is possible to make broad assertions concerning the possible advantages or disadvantages of having brothers and sisters. Furthermore, perhaps only children are more common among the wealthy, sophisticated, and educated, and they might for such reasons be more readily brought to medical attention for minor ailments.

Furthermore, unstable constitution, on a hereditary basis, will probably often characterize the only children of neurotic parents who discover their mutual incompatibility and separate shortly after marriage. Such cases

[10] Brill, *Psychoanalysis.*

must be distinguished from only children whose instability is attributed to their family status, and to the developmental influence of parental treatment. A great many of the only children coming to clinical attention belong to the former group.

A preliminary investigation,[11] free from clinical fallacies, was undertaken at Columbia University. In a New York City public school three groups of boys were selected all of whom had reached their twelfth but not their thirteenth birthday. Of the seventy-five boys, twenty-five were only children, twenty-five were first-born but not only children, and twenty-five were neither first-born nor only children. So far as could be determined there were no special selective factors in operation except these matters of family status. The homes were all those of moderate income.

To all these three standardized tests were given, one being the "Otis Suggestibilty Test," another the "Matthews Emotional Stability Inventory," and the third the "National Intelligence Test." Records were also secured from the school of the average academic marks in the case of each boy. The comparisons of results from the three groups are shown in Table XV.

In the Suggestibility test five points are given for each *resistance* to a possible twenty suggestive questions. The group differences are slight, but the only children score somewhat better or are a bit less suggestible. In the Emotional Stability test the score represents the number of unstable symptoms reported; both only and first-born children have more of these unfavorable symptoms than

[11] Unpublished master's essay in the Department of Psychology, by Mildred Korn.

TABLE XV

BIRTH ORDER AND MENTAL TRAITS

Tests	Group I "Only"	Group II "First"	Group III "Neither"
Otis Suggestibility Test:			
Average score	65.0	60.0	60.0
Variability (Q)	7.5	7.5	10.0
Emotional Stability Test:			
Average score	18.27	17.50	12.25
Variability (Q)	5.45	5.14	3.69
National Intelligence Test:			
Average score	132.5	127.5	127.5
Variability (Q)	20.8	13.1	13.8
School records, per cent:			
Average score	80.0	70.0	70.0
Variability (Q)	5.0	5.0	5.0

children who are neither. In the Intelligence test the higher score means better achievement; the only children exceed the others somewhat in these intelligence measures. And in the case of school grades the only children also have superior records.

Such slight differences as this confessedly preliminary investigation reveals are at least more reliable than the inferences based on the generalization of selected clinical cases. The results are not unfavorable to the group of only children. These are more intelligent, have better school records, are more resistant to suggestive questions, and their stability scores are not reliably higher than those of first-born children who have other children as brothers or sisters.

But the possibility of disproportionate neurotic tendencies among only children should at least call attention

to a number of developmental influences that may tend to establish maladjustment and warped personality in the case of any child. And it may well be that more careful study will show that such influences are more likely to affect children who happen to be the only ones in their respective families.

SPECIAL DEVELOPMENTAL INFLUENCES

Excessive and exclusive association with adults, in the status of a juvenile or infant, may easily lead to *habits of dependence and deference,* which may be undesirable if prolonged into maturity. On the basis of such habits there may develop distrust of self, lack of confidence and initiative, chronic suggestibility, and obedience of the fawning type, which association, play, and rivalry with other children, with equals, might serve to dispel. Adults can hardly *play with* a child, but more often *play down* to it. A healthy boy can wrestle with his brother, but not with his father. A girl's social attitude toward her sister is very different from that toward her mother, and more nearly like the attitude that will best serve her own life in maturity.

Excessive ego-centricity, self-complacency, and selfishness, again, may result from the child's claim on his elders and their solicitude for his comfort and happiness. Any "spoiled" child may readily become oversensitive to slights, neglects, and the successes of others. Thus Brill describes an only child who tried to commit suicide because another little girl had received more attention at a party.

The lack of free association with equals, in play and general social activity, may result in the development of

a chronic sense of inferiority and a prolonged "infantilism" of attitude. Sulking instead of effort may be the typical adjustment provoked by obstacles, or various familiar compensations and involvements of attitude and bearing may constitute inferior types of common reaction. The only child or the spoiled child of any birth order who learns to influence his parents mainly by squalling, readily takes the same attitude toward life, and this is an inferior adaptation. Wells remarks that "science can add nothing to the social verdict that the best laboratory of mental adaptation is a family of brothers and sisters. He was a wise counsellor who advised the young man to marry a girl who had many such."

ORGANIC INFERIORITY AND SOCIAL STATUS

The presence of an inferior conception of the self constitutes a developmental influence not to be overlooked. The child early learns of organic or social defects that distinguish him from his mates, and Adler[12] supposes that many neuroses of later life go back to the humiliation and attempted compensation of these circumstances. The balanced personality may recognize the defects and calmly or strenuously set about their rectification, as did Helen Keller, Demosthenes, Pope, and Byron. In other cases, not so favorably constituted, a fixed feeling of inferiority may result instead, with compensatory reactions which may take extreme and miscalculated forms.

In the young child smallness of stature, ugliness, a birthmark, a palsied arm, motor awkwardness, poor clothing, lack of spending money, stammering and lisping,

[12] Adler, *The Neurotic Constitution.*

wearing spectacles, disgraced parents, illegitimate birth, dominating adults, or some unexplained mystery of birth or relationship which suggests concealment and secrecy, may easily result in such inferiority attitudes.

A common reaction is the development of furtiveness, reticence, and bashfulness which may be chronic. Another is that mode of compensation which Adler calls the "fiction." The timid develops an air of bravado, just as the frightened boy whistles nonchalantly (?) in the dark. The stutterer, whose verbal modes of self-expression are thwarted, easily develops an undue and inflexible obstinacy of character in his relationships with others. He readily becomes a domineering parent, a refractory church member, a disgruntled underling, and an obstinate associate, as though, denied verbal expression, he would express himself through resistance to the ideas of others.

The will to power may assert itself in devious and roundabout ways if ordinary channels of expression are blocked. A woman whose ambitions had been thwarted by an incompatible husband, an unpleasantly large family of children, and enforced rural residence, spent a whole winter exulting over the final success of her extended effort to keep the railroad company from laying an inoffensive water conduit on her land, and was heard to remark, "At least I can do that."

If even an amiable adult can be rendered obstinate and intractable through such a compensatory reaction, the developmental influence of felt inferiorities on predisposed children may easily be underestimated. Impudence, foolhardiness, trickery, deceit, and even systematic neurotic complaints and faulty attitudes may be built up as compensations for such sensed weakness or injustice. As

Wells wisely remarks, "There is no more important element in the diagnosis of character than to distinguish whether a marked trait in the observed person is compensatory or fundamental."

REACTION TO MYSTERIES

In some cases suspected concealments, inferiorities, or mysteries of origin and status may result in less damaging fictions which take the form of fantasy. Many children develop the fantasy that their supposed parents are not their true ones. They may variously explain some apparent reticence or secretiveness on the part of their parents by the fantasies that they are foster children, stolen children, gypsy or Indian children, or holy children destined for some special mission in life. That these tendencies may result in persistent attitudes of introversion and make-believe, extending into adult life, and giving it essential temperamental features, is not an unreasonable expectation.

The suspicion, on the part of children, that some truth is kept from them, may in the predisposed lead to a general distrust of elders, and to a wariness, suspiciousness, and preoccupation with the life of fantasy. These may in turn lead to lack of cordial social companionship, exclusiveness, shut-in personality, morbid religious attachments, or perhaps to overt hostility, refractoriness, and vague animosity toward parents and other established authorities. If such reactions become well established they may constitute pronounced and generalized attitudes which entangle the individual's subsequent adjustments to the social environment.

At the questioning age, and during the period we are just considering, it is easy for such initial mysteries to be encountered, and easy for unsympathetic or ignorant parents and others to foster the growth of maladjustment. The mysteries of life, birth, death, sex, relationship, maternity, paternity, divorce, creation, religion, are all encountered as early as the questioning age, and become keenly appreciated before pubescence. Santa Claus, the stork, the Book of Genesis, the doctor, the theology of Milton, fairies, the angels, hell, the Bad Man, and other convenient parental evasions may serve to check the flow of questions. But they do not allay the childish curiosity, and they may merely pave the way for adolescent upheavals, doubts, obsessions, or perhaps for the formation of neurotic characters.

In the interests of the mental hygiene of both young and old, a warning is perhaps in order at this point. The emphasis on the possible influence of many factors ordinarily thought trivial should not serve to provoke a morbid inhibition of natural impulses and spontaneous playfulness, nor interfere with orderliness and control. In the interests of adult hygiene, much childish inquisitiveness and selfishness may be ignored. In the give and take of juvenile experience the twist given by one situation is likely to be undone by another, and the average boy or girl is as immune to these trivialities as to broken bones and microbes. The following remarks by Galton [13] are here pertinent.

Experience is often fallacious in ascribing great effects to trifling circumstances. Many a person has amused himself with throwing bits of sticks into a tiny brook and watching

[13] Galton, *Inquiries into Human Faculty*, p. 131, 1883.

their progress, how they are arrested first by one chance obstacle, then by another; and again how their onward progress is facilitated by a combination of circumstances. He might ascribe much importance to each of these events, and think how largely the destiny of the sticks had been governed by a series of trifling accidents. Nevertheless all the sticks succeed in passing down the stream, and in the long run, they travel at nearly the same rate. So it is in life in respect to the several accidents which seem to have had a great effect upon our careers. The one element that varies in different individuals, but is constant in each of them, is the natural tendency; it corresponds to the current in the stream, and inevitably asserts itself.

For such reasons it is always a wise precaution to add that saving phrase, "in the case of the predisposed," to any description of the profound influence of trivialities.

EDUCATIONAL AND VOCATIONAL GUIDANCE

By the end of this period we may expect to find clear evidence of irregular development in the case of many individuals. The simple processes, which mature by this time, may be contrasted with the more complex capacities which in the normal individual are still in process of growth. Methods of mental examination can now to advantage go beyond the act of assigning the individual a "mental age" or rating of average intellectual competence. A fairly accurate analysis of the repertoire of abilities may be made, and a profile or psychographic chart constructed, accompanied by such an account of the individual's temperamental and attitudinal characteristics as may be secured.[14]

[14] H. L. Hollingworth, *Vocational Psychology* and *Judging Human Character.*

Individuals with superior mental endowment will tend to show a profile such as that shown for them in an earlier chapter. Inferior intellectual development and average attainment will also have their characteristic and recognizable profiles, when the results of the various modes of measurement now possible are graphically represented. A fairly sure prediction is possible by this age of the limits of the individual's future intellectual growth, and such knowledge can be put to good use in planning the educational and vocational future so as to avoid fruitless endeavor, futile aspiration, and economic instability.

The capacity of the individual to profit from higher forms of symbolic and abstract training will be clearly indicated by the eleven-year period. Within reasonable assurance the question can be answered, whether the child can profitably continue academic work, or whether he will find his greater happiness and success in those forms of training directed toward specific and industrially useful skills and dexterities. Although children of this age are not yet ready to make final choice of a vocation, and although such matters should not be arbitrarily taken in hand by any constituted authorities, it is time to know, at least from the point of view of parents and teachers, what the probable vocational prospects are. These will depend on the general level of individual capacity, on the array of interests and social aptitudes, on the repertoire of special talents and defects, on the general character traits and temperament, and on such factors as opportunity, resources, and economic demand. Unreasonable decisions concerning educational and vocational future activities are more often the result of misguided parental dictation and of vague inspirational exhortation, than they are of the

natural inclinations of the boy or girl. "A high-school education for every boy and girl" is a sensible slogan only when "high school" is thoroughly revised into forms which will provide as thoroughly for the immediate social and economic adaptation of the majority of pupils as they do for the "college preparation" of the few. Such revisions are now well under way in American school systems.

EXCEPTIONAL DEVELOPMENT

The fact that many individuals never develop, intellectually, beyond the level we are now considering (between eight and twelve years of mental age) has a very considerable social and educational importance.[15] These are more numerous than imbeciles and idiots combined. At least 10 per cent of the population fail to exceed the twelve-year level of mental growth, and an equal number pass it by so narrow a margin that the groups just below and above this developmental point have been facetiously designated "morons" and "super-morons."

The British Royal Commission defined the "high grade ament" or "moron" as "One who is capable of earning a living under favorable circumstances, but is incapable, from mental defect existing from birth, or from an early age, (*a*) of competing on equal terms with his fellows, and (*b*) of managing his affairs and himself with ordinary prudence." Depending on their instinctive equipment, their early training and habits, their environment and its suggestions and difficulties, such individuals may become useful citizens on a humble plane or they may develop

[15] Goddard, *Feeblemindedness;* L. S. Hollingworth, *Psychology of Subnormal Children.*

into delinquents, vagabonds, and criminals. In the past they were often called "moral imbeciles," because of their incapacity for control by abstract moral principles. Bearing in mind the typical inability of the ten-year intelligence when confronted with such tasks as giving common-sense explanations of such concepts as "justice" or "pity"; of telling what simple fables teach; and of noting common elements or similarities in "rose, potato, and tree," "snake, cow, and sparrow"; and recognizing facial expressions of pity, scorn, and suspicion, it is clear that no "moral sense" other than ordinary intelligence need be supposed to be impaired or inadequate in these individuals. The following examples (from Goddard) will serve as concrete illustrations of the "moron level."

MORONS [16]

F (19). Was a high grade child and apparently only a little backward when admitted to an institution at the age of six. She has remained there now for 12 years. When admitted she understood language and commands, was obedient, could wash dishes and do errands, was fond of play and dolls. She improved steadily, and in a year and a half had mastered all the kindergarten work, could count to 39, could add combinations to 10, could copy easy sentences, and was interested in her work. Soon reached limit in book work, and has never been able to read beyond Second or Third Reader, knows two or three multiplication tables, and can add a little. To-day she is a handsome young woman of 19, with the appearance of a girl of 15 and the mentality of a child of 9. Improved in industrial work, is neat, careful, and can do almost any kind of housework. Obedient, affectionate, quiet and willing, is truthful and trustful, occasion-

[16] Goddard, *Feeblemindedness*. (Copyright, 1914, by the Macmillan Company. Reproduced by permission.)

ally quick tempered. A striking illustration of the type of woman who, out in the world, becomes quickly victimized, because of her quiet, innocent and unresisting manner. Pretty and attractive, she holds the attention of the passerby, is easily captured by the designing rascal and may even attract a man of more intelligence.

Her younger sister, her father, and her mother, were mentally defective.

F (24). Has been in institution 17 years. Has a mentality of 10 years. Came to institution when a little under 7. Was small, with large head, lisped, knew the alphabet, could count to four, knew color, had poor memory and attention. Was placed in kindergarten and at end of year had made marked improvement. Took active part in games and spoke pieces. After three years she could read and spell four-letter words, count from 20 to 1, speak more distinctly, showed desire to learn, count to 100 by twos, could hem and back stitch, and had commenced in the First Reader. The next year (11 years) she became a helper in the kindergarten and learned music. At 14 she could write well, do short division, knew the multiplication tables, could play on the French horn, was patient and kind. To-day (24 years) she is quiet and attractive, pleasant, needs but little supervision, and is a valuable helper in the kindergarten of the institution. Takes care of rooms of the superintendent efficiently. Can do any kind of housework and some wood work. Is proud of her accomplishments. The band master commends her work, except that she is not sufficiently careful of the instruments. She has made good progress, with the best of opportunity, yet she is unable to take her place in the world and to compete on equal terms with others. A different environment would have made of her a prostitute or perhaps a mother and wife, with a defective family, working against odds that were too much for her.

Her sister, father and mother, and all four grandparents were mentally defective. Of 40 ancestors and collaterals, only 11 are or were normal.

Having thus illustrated inferior development by cases of adults with a mental capacity not greater than that of the average ten- or eleven-year-old, we may illustrate superior development by an individual of eleven years or thereabouts, whose mental capacity far exceeds that of the average adult.[17]

A boy, whom we will call H. At the age of eight years and four months he had been given a long series of mental tests, because of striking abilities he had displayed in school. At this time his mental age was 15 years and 7 months,—his I.Q. being therefore 187. "On the curve of distribution of intellect he stands eleven times the probable error removed from the norm, a position occupied by but one child in more than a million. He stands as far removed from the average in the direction of superiority as an idiot stands removed in the direction of inferiority."

His ability to handle symbols, language, and abstractions, was remarkable. In tests of manual dexterity he was no better than average. He was taller and heavier than the norms for his age. He had not only carried school work three years in advance of his age, but, under private instruction, had studied geometry, Latin, Greek, French, German, four other languages, and astronomy. His favorite occupation had been reading, and he had not cared for childish plays.

Before his twelfth year he had finished high school and had passed the comprehensive examinations of the College Entrance Board, for Harvard College. At the age of 12 years he made next to the best record among 483 candidates in the Mental Tests for Freshmen given by Columbia College, the average age of his competitors being 18 years.

About one year later he was given the Army Alpha intelligence test, and scored 194 points,—the norm for his age being 47 points, and that for freshmen in the best colleges

[17] This case is much abbreviated from the account of Hollingworth, Garrison, and Burke, in *Journal of Applied Psychology*, 1917 and 1922.

being about 150! At the age of 13 years he was a college sophomore of advanced standing, doing excellent work, which his teachers variously characterized as "remarkable," "extraordinary."

He participates in the extra-curricular college activities, takes part in the class exploits and battles, and in the class play. He is especially interested in history, languages, and anthropology, and expects to become a minister or missionary.

CHAPTER XII

THE "AWKWARD AGE"—ADOLESCENCE

Among the various developmental stages, infancy has been most tenderly portrayed in the art of painting. Romantic literature has, instead, featured the period of adolescence. In poetry, in fiction, in pedagogy, and in semiscientific description, a characteristic exaggerated fervor is encountered when the life of "youth" is delineated. In poetry and fiction the tone is that of a glowing enthusiasm. In pedagogy and the literature of "mental hygiene" there is a more ominous tone, as if adolescence were a disease, or an organic and spiritual cataclysm into which the child plunges in its march to steady maturity. That a certain unrest or dis-ease may be a feature of the period is true, but the tendency to assimilate the picture to the "entities" of the clinic has been misleading. We can best understand the psychological phenomena of this developmental period by distinguishing clearly between the parts played by intrinsic and by extrinsic influences.

THE PUBIC CEREMONIES

Ethnologists report various ceremonials or ordeals in which the children of primitive peoples are made to participate upon their arrival at the age of sexual maturity, which is the age of adolescence, beginning with the physical and physiological changes of puberty. A brief in-

dication of the nature of these ceremonies serves as a suggestive introduction to the discussion of adolescence in civilized social life.[1]

Among some tribes the girl receives the greater attention. Thus among certain Alaskan Indians the first great event in the life of the girl is her arrival at reproductive maturity. The old custom was to banish her for six months in a small hut, from which she was not allowed to stir in the daytime. After dark she was permitted to leave this shelter only when accompanied by her mother and when wearing specially designated garments. During her incarceration she was busily employed at sewing, weaving, and making baskets. On the first day she was marked by inserting a pin through her lower lip. During certain periods she fasted. In ceremonial ways she was at times permitted a simple fare, and even her use of water was calculated to impress ideas and habits of patience, industry, and self-denial. Presents were sent by various relatives. The foods she was allowed to eat were controlled by magical notions concerning their effects upon her stamina, her beauty, and her character. At the end of the period she was exhibited at a public gathering, her skills and virtues were displayed, and, being thus "introduced to society" she might be approached by various suitors. The ordeal thus served to inculcate in her the domestic arts she would need in her own tribal life, to emphasize the necessity of submission, industry, the tribal "feminine" virtues of conduct and appearance, and to suggest suppression of curiosity and limitation of the free activities of childhood.

[1] Hall, *Adolescence;* Thomas, *Source Book for Social Origins,* Part II.

In other tribes more attention is accorded the adolescent boys. The "initiation" ceremonies, in a dramatic way, transfer the youth, arrived at puberty, from association with the women and children, and introduce him to the society of men and the wider life of the tribe. Thus in one tribe, after a preliminary performance, all the members assemble just after sunrise, and form in a large circle. In this circle the men and boys dance. The "candidates" are then pushed forward by their mothers and commanded to "enter the circle." Thus they relinquish their personal authority, and the family rule gives way to the rule of the tribal chief. In some tribes boys are put through tests of their courage and skill. Some of the teeth may be knocked out or the boy dragged by the hair. The candidate may be flogged, made to eat loathsome substances, or to partake of magical foods, to go through fire, to submit to tattooing. After having passed these "tests" of tribal fitness, the youth may assume adult garments, ornaments, and weapons, and make himself attractive to the women of his tribe and terrifying to the tribal enemies. The net results seem to be separation from the family, adoption by the larger tribal group, assumption of adult duties and responsibilities, inculcation of tribal mores, customs, and beliefs, and emphasis of the dignity and authority of the elders outside the family circle.

In modern life these primitive pubic ceremonies survive in the form of début, confirmation, school graduation exercises, the issuance of "working papers," adoption of adult modes of dress, the legal "age of consent," and a great variety of less formal practises.

PHYSICAL INFLUENCES

In modern life such special manifestations as may appear at adolescence are to be attributed chiefly on the one hand to characteristic physical changes, and the mental adjustments which they involve; and on the other hand to conventional social pressures and the press of typical environmental problems. The suggestion that mysterious psychic urges clamor for expression at this time and that adolescent mental experience is controlled by the flowering of mystic psychic forces, may be postponed until we have seen how adequate physical and social factors are to account for such phenomena as may be genuinely demonstrated. Among the physical changes of this period we may usefully distinguish between the general modifications of physique and the special modifications associated with the development of the reproductive system.

Beginning with the first signs of puberty there is in general an acceleration of physical growth. This acceleration begins earlier in girls than in boys, so that in the early adolescent days girls are on the average both taller and heavier, although muscular strength and vital capacity, under modern conditions of life, may remain less than those of boys. But with the somewhat later arrival of puberty in boys, the acceleration which they in turn show takes them again beyond the average measurements of girls.

In addition to these increases, there is marked change in proportion, occasioned by differential rates of growth in different bodily parts. Hands and feet enlarge, legs and arms extend, while the girth changes are relatively less conspicuous. The voice changes, especially in boys, and

the growth of hair on the face and other bodily regions becomes marked. These changes are somewhat dramatically described by Hall in the following words:

> The annual rate of growth in height, weight and strength is increased and often doubled, and even more. Growth of parts and organs loses its former proportions, some permanently, some for a season. Some of these are still growing in old age and others are soon arrested and atrophy. The old measures of dimensions become obsolete and old harmonies are broken. . . . Bones and muscles lead all tissues, as if they vied with each other; and there is frequent flabbiness or tension as one or the other leads. Nature arms youth for conflict with all the resources at her command—speed, power of shoulder, biceps, back, leg, jaw—strengthens and enlarges skull, thorax, hips, makes man aggressive and prepares woman's frame for maternity." [2]

These modifications produce changes in the incoming sensory manifold as well. They make adjustments, posture, gestures awkward, they outrun the duration of garments, and provoke clumsiness both of appearance and of action. The self-consciousness of the individual is thus increased, and further magnified by the comments and gibes of elders and associates. The mass of organic sensation is not stable, but is undergoing constant change. This modifies that sensory background which in large measure comprises our self-awareness at a given moment. Self-attentive tendencies are thus encouraged, and attention easily deflected from objective activities to subjective conditions.

The specific changes in the reproductive system and the secondary changes associated therewith are perhaps less

[2] Hall, *Youth*, p. 6.

conspicuous in boys than in girls. Primary sex characteristics develop slowly, and are fairly mature by this time. Reproductive organs increase in size and prominence, with the general spurt of growth, and their specific functions are more readily and easily set up. Attention is drawn to these changes by sensations from the organs themselves, by their readiness of function, and by the fact that greater freedom of action and social participation places the boy constantly in situations calculated to arouse sex excitement. Conversation with older boys, quack literature, solicitation, and inadequate knowledge of sex affairs in general, definitely sets the adolescent boy toward sexual preoccupation. Morbid curiosity, suspicions of personal injury or defects, habits of self-abuse, and the impulsive character of the sex urge in males increase self-consciousness and give it a turn that is repressed. Habits of introversion and brooding may be encouraged, and fantasies and prospective scenes are elaborated. The secondary sex characters with boys also become conspicuous. The voice changes and often lands the embarrassed youth in moments of awkwardness; tendencies to stutter or stammer are aggravated; and the situation is often heightened by ridicule or by well intentioned but poorly instructed reproofs or punishments. The appearance of hair on the face increases self-consciousness and very often the refusal of parents to permit the boy to shave "before he is old enough," or keeping him in juvenile clothing so as "not to lose their boy," brings positive torture to the self-conscious youth. Some boys report that during these days they resorted to furtive shaving with whetted jackknives and bits of glass, since razors were withheld and pocket money was not available.

In the cases of girls the reproductive changes are constantly borne in upon consciousness, call attention to new phases of human conduct, modify the relations to others, and give new significance to familiar situations and acts. Periodical physiological changes, often misunderstood and associated with mystery or misinformation, are often given an unnatural setting, increase self-awareness, and profoundly modify the mass of organic sensation heretofore constituting the nucleus of self-consciousness. Pain or indisposition involve difficulties in play or in social engagements in a manner not previously encountered. Although sex interests are less impulsive than in boys, the changes are definite and affect not only the individual's self-preoccupation but also her attitude toward playmates and parents. The secondary sex characters in the girl concern mainly changes in shape and figure, which entail modifications of dress, and the newly developing structures add to and modify the general organic background. The development of hips and breast entails changes in posture, carriage, and gait, which are increased or complicated by the general tendencies of height and weight and bodily proportions. Voice changes, ordinarily not embarrassing, also occur, chiefly in the way of increased richness and quality, or timbre, and perhaps in volume.

Some writers on adolescence lay great emphasis on the influence of the maturation of the nervous system at this time. It seems evident that many nervous developments, both in the central system and in the peripheral organs, continue to grow until the adolescent period. Thus capacity for pitch discrimination, and for other performances involving the elements of musical ability, although they do not vary significantly with differences in general

intelligence (bright children are not in them superior to average children), nevertheless continue to improve with

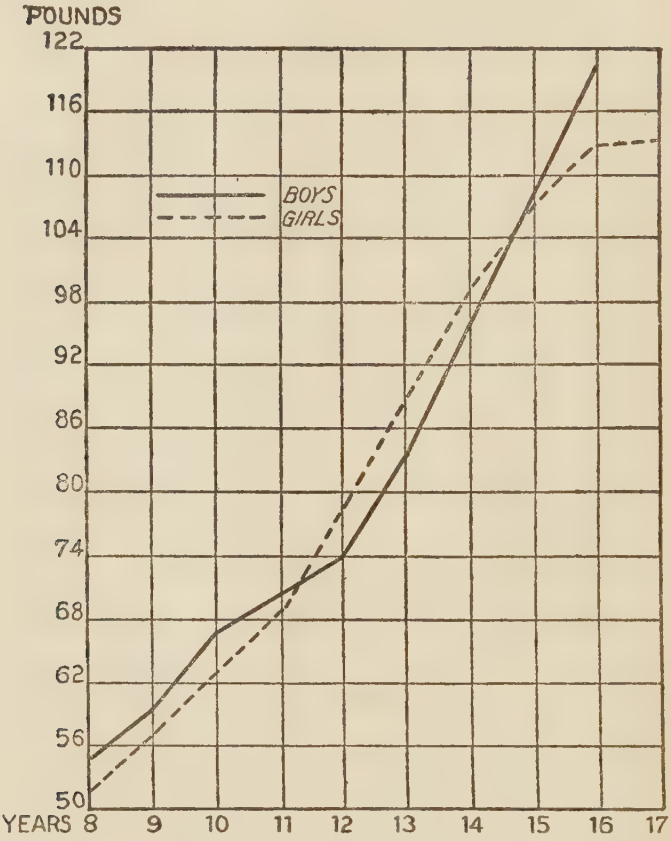

FIG. 16.—AVERAGE WEIGHT OF BOYS AND GIRLS AT DIFFERENT AGES.

From data of Boas and Burke, showing the greater size of girls in early adolescence.

age up to early maturity. Such nervous features as underlie the growth in intelligence and in capacity for the more

elaborate forms of memory and reasoning also continue to develop until the adolescent period. But since these changes are gradual and apparently uniform in rate, such particular phenomena as distinguish the mental life of adolescents would seem more directly related to environmental features than to anatomical changes in the nervous system.

Other writers lay greater stress on the development of the glandular system, especially the ductless glands of internal secretion, the suprarenals, thyroid, pituitary, pineal, and sex glands. These glandular activities are closely related, in very complex ways. Secretions of the suprarenal glands appear to be important for the maintenance of general bodily tonus and for those mechanisms concerned in the mobilization of physiological resources in moments of stress, effort, and emergency. The pituitary and pineal organs seem to be closely concerned with processes of growth and metabolism. That the thyroid plays a conspicuous part in the processes of growth is shown by the various forms of disturbance associated with faulty thyroid secretion. Early thyroid insufficiency results in the striking form of impeded development known as cretinism. Thyroid excess or deficiency in later life may also result in various complications of metabolism, sensitivity, and general health, as in myxoedema and exophthalmic goiter.

Proper balance of these various glandular systems seems also to be essential for the appropriate development of the reproductive system. In addition to the production of the specific sex cells, the sperm and ovum, the reproductive system (or structures intimately associated with it) also affords internal secretions controlling the development of

the secondary sex characteristics. Although speculation tends to outrun established knowledge in this field, it seems clear that certain forms of instability at the time of adolescence, as at other periods of life, may be closely related to forms of glandular imbalance.

MENTAL ADJUSTMENTS WHICH PHYSICAL CHANGES INVOLVE

Even if there were no changes in the attitude of the elders, nor in economic, vocational, social, educational, and domestic features of life, these physical modifications would in themselves suffice to make the life of some adolescents varied and unstable. The rapid changes in growth, in the girl, lead to the adoption of adult apparel and general adult resemblance, with a corresponding shift in feeling and attitude.

Since the physical maturity of the girl comes earlier than that of the boy, girls are now likely to shift their associates considerably. They become the playmates or companions of young men who have hitherto been considered much older. Since they are actually older, both in age and in knowledge, the girl must adopt rapidly a distinct shift in attitude, idea, and mode of response. She encounters proposals and situations that would seldom have reached her a year or two earlier. She is definitely sought after by young men, and friendships become quite different affairs from the non-sex partnerships of girlhood and boyhood.

Since she has ceased to be a child she tries to put away childish things, not always with ready success. She may combine with adult situations the liveliness and noisiness of the "big Injun" age which she has not entirely outgrown

or suppressed. Or she may seek to repress these tendencies by becoming a woman overnight, adopting affectations, exaggerations, imitative attitudes, and enthusiasms. Girls she may have played with throughout her childhood may become mothers before she herself fully realizes that she is an adult, and these experiences react upon her ideas, her attention, her plans, and purposes.

The new sex-colored relations lead to the spirit and practises of coquetry, to the jealousies and rivalries of courtship. The girl chooses her reading with new motives, and is allowed to read books and to discuss topics heretofore proscribed. She assumes new privileges and responsibilities, meets new temptations, finds new attractions, plays different games, and is accepted on a different basis of understanding and expectation. The physical changes, and the mental adjustments to which they lead, may thus conspire to produce, in those not endowed with average stability, a period of the classical "storm and stress." How this condition is furthered by incidental and extrinsic factors we shall inquire at a later point.

In the boy the physical changes lead, or may lead, to equally profound modifications of mental content, feeling, or purpose. The active impulses and reflexes of his maturing body incline him toward their satisfaction. Girls tend to become sex objects, and he plays not with them but to them or before them. Each new girl acquaintance may be met as a possible sweetheart or wife. His secrets cease to be the property of the gang, and become his own personal affairs.

His physical growth usually leads him, through choice or against it, to active physical occupation. His mind is set toward vocation, toward his own future, and toward the

ultimate establishment of a home in which his new aspirations and impulses may find satisfaction. Left behind because of his slower maturity, he now finds his playmates among the girls whom he has been considering "babies," and he is destined to several successive drops in the age scale before he finds his final level. His increasing frame leads him also to new modes of apparel, and into the company of grown men who now speak freely of matters hitherto somewhat kept from him, although this restriction has commonly not been so great as in the case of girls.

Playing up to the girls, which seems to him to call for a mildness, a courtesy, and a certain fineness of attitude, is mixed with the outbursts of strength and vigor that lead him to physical combat and exploit among his mates of the same sex. Conflict between these tendencies involves certain elements of instability and struggle between two sets of impulses. Being large and in long trousers he now wishes to be a whole man; to keep late hours, to swear and smoke, or at least to possess some symbols of liberty in keeping with his new dignity. Perhaps engaged in work for which adults receive pay, he wishes to be an economic as well as an industrial unit. Requiring money for his courtship, for his secretly bought razor, and for other manly dignities, he does not want to "ask papa" for every cent he disburses, nor to account for every penny he may spend.

He desires to choose his own companions, whether male or female, and to assume his own responsibility for their good character and influence. He resists constraints, especially those of parents and other elders. All these changes in mental outlook, in thwartings, and in satis-

factions, ideas, and purposes, result from his being larger and sexually mature. They are variously complicated by other factors in the way of social pressure, later to be described.

It should not be supposed that such changes as we have here recounted occur suddenly nor like a cataclysm. In at least 50 per cent of human beings their onset is so gradual, and the individual moves so uninterruptedly from childhood to industrial activity, and has so few intellectual problems and conflicts, that we may expect nothing but the physical changes themselves to be characteristic of the age. But it is nevertheless true that with higher intelligence levels, predisposed personalities, and more complicated environment, there may be genuine psychological difficulties to be reckoned with.

INDIVIDUAL DIFFERENCES

Probably half of the race fail to experience the classical mental difficulties of adolescence. At least we know that half of the race apparently reach their intellectual maturity by the mental age of fourteen or thereabouts, and their modes of mental difficulty are perhaps local and fle
except under circumstances which exact of them a
ments which their mental limits render impossibl
individuals probably never realize the conflicts a
gles that are portrayed in the questionnaires ab
cent experience. Maturing slowly, they fit
gradually into humble situations. Leaving s
eighth grade or before, they are never introdu
and history, to problems of ethics and phi
are untroubled by problems of human

destiny, and do not question the foundation of their conventional religious institutions. They proceed with their work, regard the laws as inconveniences, conflict occasionally with them, but never succeed in working up any intellectual frenzy.

Even in the case of the more competent 50 per cent, the phenomena attributed to adolescence do not suddenly begin with the days of puberty nor cease with them. Many of the difficulties of adjustment may be traced back into childhood, and the classical forms of mental and emotional distress often continue well up into college years and later. But sooner or later the conflict of young and old will assert itself, and sooner or later it will be resolved. The cautions of the elders, their wise attitudes toward youth and its "dangers," their values and codes, their staid and dignified insistence on the proprieties, will be found annoying.

The intellectually superior adolescent feels a new freedom, suggested by his strength and vigor and by his maturing capacity for reflection, and is more or less likely to take things on their merits rather than on the basis of tradition. The radicalism and revolt of youth have become by-words
mon speech. The elders cleave to institutions de-
serve their own needs. Newer needs and prac-
only tolerate, but youth is in the midst of these
ts. In a changing world the cherished per-
old techniques annoys. Thwarted by many
e old régime, intellectual youth may rebel
irely, and strive to fashion a new régime
vn needs and insights. Revolt even against
s own make-up is common, and adolescence
ately subsequent years constitute the great

age for voluntary reshaping of the individual personality to conform to its own standards. On this impulse correspondence schools and publishers of volumes on quick methods of attaining will power, beauty, and charm flourish.

The discovery that many dogmas and cherished faiths of childhood represent error and illusion leads easily to suspicion of all accepted tradition, in the intellectually critical (who comprise, to be sure, but a small proportion of adolescent individuals). Religious dogmas, literary standards, political methods, social institutions may all go into the discard until youth finds better ones or becomes discouraged in the search. In due time the youth becomes a conservative, a radical grown beyond adolescence.

PARENTAL HABITS AND NEEDS

Adolescent difficulties often originate in the elders rather than in the young. Parental control, although it tends to relax at this period in some respects, is commonly not entirely relinquished. Habits of authority, exaction of obedience and respect, are not readily given over. In many cases the realization of the dangers and temptations of youthful indiscretion even leads to increased rigor of parental control, just at the time when the size and dress of youth suggests that it should be reduced.

Parental needs of occupation and affection often complicate the environmental pressures, and render difficult the healthy loosening of domestic ties and the establishment of independent life and personality. Perhaps the most conspicuous environmental change at adolescence is the breaking of family connections and the launching of the individual into the larger social stream. Such a course

involves many intellectual changes, on the part of the more intellectually sensitive.

Heretofore the individual has been a child, fed and clothed, guided and protected, advised and directed by elders. Now necessities of choice and individual initiative and responsibility arise. Mental conflicts may be thus occasioned. One does not at once abandon old attachments, old reliances. One cannot suddenly cease to be a pet and become a worker, and emergence into the wider world often serves to disclose personal weaknesses, as well as the weaknesses of one's elders and their family traditions. On the part of weaker individuals such conflicts often incline toward a childish retreat to the parent or toward some parental surrogate, and infantile adjustment takes the place of adult development.

These difficulties are enhanced by the common reluctance of wealthier and educated parents to see their children leave the home just when their companionship is becoming most agreeable. Parents thus have their own habits of dependence, which impede the free development of youth. Especially on the part of the mother, who traditionally gives her whole attention to the children, and for whom home-making is a vocation, this adolescent flight seems to take away the very purpose of her being. She often readily fosters such infantilisms as assert themselves, may express overt pride and satisfaction in them, and thus obstructs the assertion of maturity and independence in ways which primitive tribes prevented by formal ceremony.

SOCIALIZATION

All these difficulties are real, and must be reconciled by mutual understanding, and by a comprehension of the

underlying principles of mental development. The values of age and of youth may both be conserved if adjustment is on the basis of intelligent insight rather than on emotional inclination alone. But however rapidly the solution proceeds, the socialization of the adolescent will progress in one way or another. His rules of conduct tend to become more and more social values instead of parental precepts. His heroes become the characters of history, fiction, or public life, rather than the uncles and cousins, parents and playmates.

In adolescent games and play, although individual competition is still strong, socialization appears even more markedly than in the plays of the "big Injun" age. The center of loyalty shifts from the gang of the neighborhood, to some institution, the school, the club, the town, the political party, and even to such abstract entities as the state, the nation, and the "causes" of current propaganda.

Leadership and willingness to follow a leader become more prominent, and team games involving elaborate organization, calling for subordination of the individual to the total result or final goal, become more common. The sexes become mutually interested, and although common games of the team sort, permitting the participation of boys and girls jointly do not commonly develop, there are many play activities which permit the expression of individual preferences for one another and the indication of special attachments. Dancing is the most common of these.

There is also a tendency for boys to organize games and enterprises at which girls will be spectators, thus affording play for impulses of display, involving skill, strength, and courage. The onlooking girls may also vie with one

another in the display of charm of person or of dress. To what degree such tendencies are purely traditional in their determination it is not easy to learn. But naturalists [3] report on the part of many of the lower animals similar performances in which the males dance, fight, sing, or display their feathers, sometimes in group fashion, but more often with what seems to be an element of individual competition for the attention and favor of the females. As society is at present organized, at any rate, it is in and just after adolescence that the "strutting" of the male and the "coquetry" of the female show their most vigorous development. All this is part of the wider socialization which leads finally to the institutions of the new generation, and paves the way for the "institutionalization" and complacency of the adult.

DOUBT AND INTELLECTUAL ANXIETY

Much has been made of the intellectual struggles of adolescents over religious and ethical problems, and sometimes over general philosophical issues. We may be sure that the majority of adolescents (who fail to pass beyond the fourteen-year level of intellectual attainment) are free from these more spiritual tribulations. Those who show them are among the relatively small number of exceptionally keen and discerning, for whom something more than rules of conduct are required, who feel the need of an actual philosophy of life or a religious faith that is established on firm foundations. Among these, religious anxieties commonly occur, and in the evangelical churches the phenomena of "conversion" have been shown to be par-

[3] Darwin, *The Descent of Man*, Part II.

ticularly prominent at this age. Some of the more gifted of adolescents have left on record, in the form of diaries and adult recollections, the story of their youthful intellectual anxieties.

Before the age of adolescence there is little need and little aptitude for abstract principles or formulations of conduct. Action is essentially on the basis of habit, and moral decisions are arrived at, in the typical case, by classifying acts under such categories as "the naughty," "the gentlemanly," and the like. Such evaluations are largely on the perceptual level and demand relatively little reflection or abstraction. Now it is characteristic of habits that conscious attention deliberately directed toward them, may interfere with their smooth execution. It is especially when we strongly strive to make our handwriting "good," as in an album or hotel register, that our motor coördinations go to pieces. It is when, before an audience, we strive deliberately to make our speech impressive, that we lose our fluency and stammer or confuse our words.

In something like the same way, reflection about our standards may result in the toppling of those standards. The adolescent is in many ways led to the reflective consideration and questioning of his previous standards and values. He realizes the conflicts and contradictions between what is naughty on the street, naughty in the house, naughty in the schoolroom, naughty on the seashore and in church. He becomes more intimately and observantly acquainted with families with standards varying from those of his own home. And he learns that many of the firm faiths of his childhood were merely impressed upon him as a pastime or as a convenient refuge by his elders. In the more alert and thoughtful these conflicts require

reconciliation, and this requires some general point of view or philosophy of life, or at least some acceptable creed and set of personal values.

Until the new standards are formulated, or the old reaffirmed, there often comes the period of intellectual storm and stress, and with exceptionally gifted individuals, the period of reconstructive and utopian enthusiasm. Or there may be a vacillating tendency to adopt any philosophy that is temptingly sponsored, a labor philosophy, an anarchistic one, agnosticism, idealism, or orthodoxy. In some cases a personally satisfying formulation is arrived at. In others new standards are accepted by convention, or old habits are revived without reflective justification or on a rationalized basis. Such solutions are accelerated by the encroachment of the domestic and industrial demands of adult life. Perhaps the best hygienic agency for this period is the intelligent understanding of the organic basis of these vague intellectual and emotional forms of unrest, which will prevent their being confused with inspiration, a divine call, the approach of insanity, or other improbable events.

ADOLESCENT INTELLIGENCE, EDUCATION, AND VOCATION

By the close of the adolescent period intellectual development in so far as it depends on growth, commonly reaches its maximum. Emotional elaboration will continue, under the influence of experience, and changes of interest, attitude, and disposition will still continue. Knowledge and skill, acquired through learning as distinguished from growth, may increase until late in life. With many, especially those whose initial mental growth

has been rapid, the evidence suggests that development may continue to a point beyond that at which the average individual stops. In fact in some cases the psychological experiences attributed to adolescence in the classical accounts do not appear or do not cease until the earlier years of adult life. On the other hand, the average and inferior constitutions cease to grow mentally in the early years of adolescence.

Mental measurement of large numbers of recruits in the United States Army during the draft in the late War suggest that after the age of fourteen or thereabouts mental ability does not in the average case increase as a simple factor of age.[4] Apparently mental growth has developmental limits not essentially different from those of such physical traits as stature. The average individual, at adolescence, is not quite able to do satisfactory high-school work of the traditional abstract and literary type. Studies of adolescence based on high-school and college reports are therefore quite misleading, although the results from such individuals are perhaps of greater importance than those from the average adolescent.

In general then we may say that the average intelligence of the adolescent is that of the average adult (intelligence should of course not be confused with knowledge, skill, or character). Intelligence represents the capacity to learn; what is as a matter of fact learned, is another matter, although it is in many ways dependent on intelligence. As our high schools are now organized and their curriculums formulated, many adolescents who are urged to enter upon such a course of training must fall

[4] Yerkes and Yoakum, *Army Mental Tests;* Pintner, *Intelligence Testing.*

by the wayside. Thus Terman reports that "in the average American city not more than 40 per cent of the pupils who enter the first grade remain to enter high school, and ordinarily not more than 10 per cent graduate from the high school." Frequently a third of those who enter high

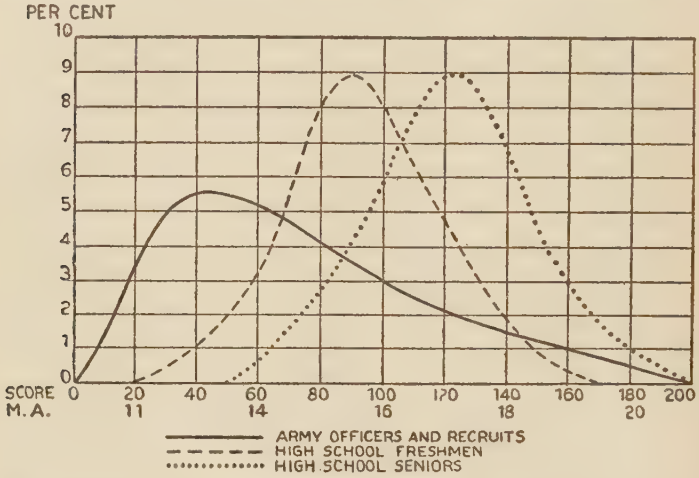

FIG. 17.—SHOWING THE RATING IN ALPHA TEST (SCORE) AND MENTAL AGE (M.A.) IN THE CASE OF HIGH-SCHOOL FRESHMEN, HIGH-SCHOOL SENIORS, AND U. S. ARMY RECRUITS (LITERATE) AND OFFICERS FROM THE SAME GENERAL GEOGRAPHIC SECTION.

(Adapted from Cobb, *Journal of Educational Psychology*, Nov.-Dec., 1922, by permission.)

school drop out without completing the first year of work. At least a large part of this "elimination" is due to the actual inability of the individuals to handle work of the high-school level.

The accompanying set of curves, adapted from a report by Margaret V. Cobb, of the intelligence of high-school students in certain western states, has many interesting

suggestions bearing upon the intelligence and educational capacity of adolescents. Three curves are shown. One gives the distribution (in points on the Army Alpha intelligence test) of recruits from this same section of the country. The average recruit is seen to score about sixty points, which is the equivalent of approximately fourteen years of mental age. The second curve gives the intelligence ratings of students just entering high school. The third gives the ratings of high-school seniors, which is considerably higher, partly as the result of actual further growth, partly as the result of elimination of the less competent in the earlier high-school years. It is clear that only superior adolescents are capable of doing high-school work.

The larger number of high-school mental-age ratings are above the fifteen-year level. There is normal tapering of the curves in both directions. But below the fourteen-year level of mental age there is a conspicuous absence of cases among the freshmen, and among the seniors there are practically none rating so low as this. It is at least clear from such results that the adolescent with a mental age of less than fifteen years will not be able to handle the intellectual tasks set for his high-school associates. And those on this level are, except in cases of exceptional energy and application, destined to do unsatisfactory work, to meet with discouragement, and probably to be eliminated before graduation either on voluntary or on compulsory grounds.

That such individuals should nevertheless receive training which will make them economically independent and socially competent, is evident, for they represent nearly 50 per cent of the population. Provision for such train-

ing is gradually being made in the common school system, as the number of high-school entrants increases. The adolescent should carefully take stock of his intellectual equipment, or his parents and guardians should, before determining the nature and extent of further education of the formal kind.

The problem of vocational guidance is one with which schools and society at large are now definitely occupied. The possibilities of individual diagnosis are not yet sufficient so that very specific recommendations can be made, but useful information can be given concerning the general direction in which probable satisfaction and reasonable accomplishment will lie. At present there is little relation between the ambitions of adolescents and the limits which their native endowments place upon their careers.

Proctor has made a study of the vocational aspirations and plans of 930 high-school pupils in eight different high schools, and compared these with the actual numbers of people engaged in the various lines of work in the United States. He writes, in discussing these results, as follows: [5]

> Vocational opportunities, as shown by the United States census reports, are just about the reverse of the distribution of high school pupils' occupational choices. Agriculture and the mechanical and industrial arts engage the energies of 61.1 per cent of the gainful workers in the United States, and only 8.8 per cent of the high school pupils had ambitions looking toward these fields. Business and clerical employments enlist only 14.1 per cent of the gainful workers of the country; and yet 29.7 per cent of the high school pupils plan

[5] Proctor, "Psychological Tests and Guidance of High School Pupils," *Journal of Educational Research*, Monograph No. 1 (June, 1921).

TABLE XVI

INTELLIGENCE AND OCCUPATION

Vocational Category	Intelligence Level in Terms of Mental Ratio or I. Q.	Educational Category	Male Adults Engaged, in Percentage of Total	Number of School Children Thus Rating, per Cent
Highest professional and administrative work.	Over 150	Scholarships and University Honors	0.1	0.2
Lower professional and technical work	130-150	Scholarships (Secondary)	3.0	2.0
Clerical and highly skilled work	115-130	Central or Higher Elementary	12.0	10.0
Skilled work. Minor commercial positions.	110-115	Ordinary Elementary	26.0	38.0
Semi-skilled work. Poorest commercial positions	85-100	Ordinary Elementary	33.0	38.0
Unskilled labor and coarse manual work.	70- 85	Dull and backward classes	19.0	10.0
Casual labor	50- 70	Special schools for the mentally defective	7.0	1.5
Institutional cases (imbeciles and idiots) ..	Under 50	Occupation centers for the ineducable	0.2	0.2

to enter these fields of effort. . . . In spite of . . . liberal interpretation of the term "professional" only 4.4 per cent of the gainful workers of the country are found to be engaged in professional service in this country. Nevertheless the profes-

sional and unclassified divisions (of the table) include 574 choices, or 61.7 per cent of the total number.

Although it is a fact that the high school represents a rather highly selected group of young people from whose ranks the clerical, business and professional occupations are very largely recruited, it is apparent that by no means 91.2 per cent of high school pupils will find their way into these occupational fields. Furthermore for their own best good and the best good of the nation a great many of them should be directed toward the agricultural, mechanical and industrial fields.

Useful suggestions concerning the relation of intelligence to occupational outlook are to be derived from recent studies of the intelligence of individuals found in various occupations. The results in Table XVI are adapted from data given by British investigators,[6] based on the study of census returns for the city of London, and on the examination of London school children by means of intelligence scales. These figures are given as only "the roughest approximation," and as a "tentative table," but as we shall see, the results are well enough confirmed by American data also.

The following graph[7] shows the distribution of intelligence ratings of the middle 50 per cent of various occupational classifications, from the study of the records of army. The distribution is shown both in terms of "points" army recruits among the draft forces in the American in the army mental test, and in terms of equivalent "mental age" standards. It is clear that there is a great overlapping, in intelligence, of individuals in the various occupational groups. But there is also a distinct shift

[6] "A Study in Vocational Guidance," Industrial Fatigue Research Board, Report No. 33, 1926, p. 13.

[7] Yerkes and Yoakum, *Army Mental Tests.*

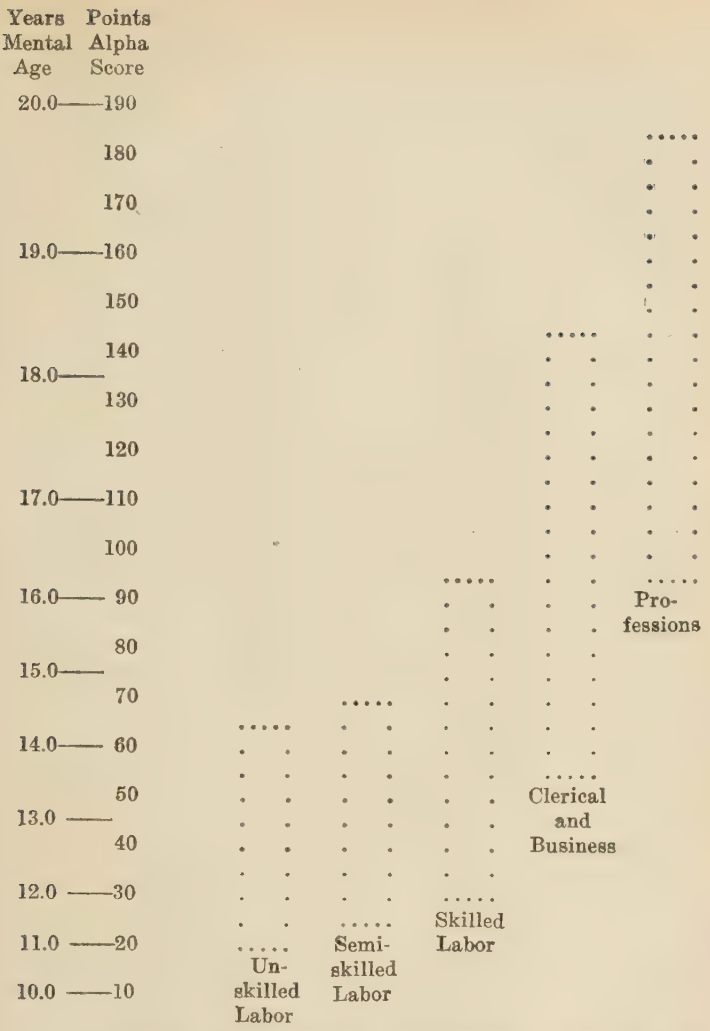

FIG. 18.—SHOWING THE RANGE OF INTELLIGENCE SCORES OF THE MIDDLE 50 PER CENT OF VARIOUS OCCUPATIONAL GROUPS, ON THE BASIS OF THE U. S. ARMY EXAMINATIONS OF 36,500 RECRUITS.

Adapted from *Memoirs of the National Academy of Science*, XV, 1921, p. 829.

of level toward the upper limits, in the case of the three more skilled groups. An individual with a mental age of thirteen years is below the middle 50 per cent of his associates if he enters the field of clerical and business work, and this is very likely to impose distinct limits upon his achievement and satisfaction, in spite of whatever virtues of character and temperament he may possess. And an individual rating sixteen years in mental level will be in the upper one-fourth of those engaged in any of the three "labor" groups and is probably capable of worth-while achievement in other lines.

Such general information as these various studies afford can be used to good advantage in the hands of wise vocational counsellors, teachers, and parents.[8] Special difficulties of adolescent adjustment constantly arise in clinic cases because an adolescent, natively limited in mental endowment of the abstract kind, is nevertheless urged by ambitious parents to prepare himself for college, for professional activity, in keeping with the family traditions. School officers also encounter many maladjusted cases whose trouble originates in this encouragement of the adolescent's reach to exceed his grasp.

ADOLESCENT EMOTION AND SENTIMENT

Much has been said in the literature of adolescence concerning the emotionality of the period. The period as a whole is often minutely subdivided into sections, each with its own emotional features. Thus it is often asserted that early adolescence is the age of hero worship

[8] H. L. Hollingworth, *Vocational Psychology* and *Judging Human Character.*

and personal attachments and loyalties; middle adolescence, according to Pringle,[9] is "the period of self assertion; it is the time when the ego comes into its own and to some extent slips into the place of the hero"; late adolescence is described as "a period fraught with great possibilities for coöperation and leadership." These divisions are based in part on the supposed dominance of certain emotions and sentiments in successive years, and on the changes in intelligence and capacity. It is true that adolescence is, as is commonly said, "a period of rich and vital possibilities." But so are infancy, and maturity, and senescence as well.

"No period of human development" remarks Pringle, "has been more sinned against . . . than adolescence." In no respects is this so true as in the exaggerated accounts of the adolescent emotional life. Childhood, in its way, is controlled by impulse and emotion. Maturity is motivated by established sentiments and attachments. Senescence is also marked by emotional emphases of a somewhat more depressing and asthenic tone. The "new birth" and the "turbulence" of emotion commonly ascribed to adolescence are in the first place not at all characteristic of half of the race, and the appearance of emotional intensity in the other half is largely the result of environmental complications rather than of inner developmental renaissance.

A brief consideration of the general nature of emotion and sentiment may serve to put adolescent experience in a clearer light. "An emotion," writes Woodworth,[10] "is a conscious stirred-up state of the organism." "Any emotion represents internal preparation for some type of

[9] Pringle, *Adolescence and High School Problems.*
[10] Woodworth, *Psychology.*

overt action." "Emotion represents bodily readiness for instinctive action." It is well also to bear in mind the quotation we have already made from Shand, to the effect that "every primary impulse, whether it is independent or belongs to a primary emotion, is innately connected with the systems of fear, anger, joy and sorrow, in such a way that, when opposed, it tends to arouse anger; when satisfied, joy; when frustrated, sorrow; and when it anticipates frustration, fear."

These wrought-up internal states represent, from the point of view of the outside observer, agitations in the activity of the visceral systems, vaso-motor changes, glandular activities, widespread changes of muscular liveliness and tone induced in part by glandular secretions, tensions in those involuntary muscle tracts and organs controlled by the autonomic system, and incipient impulsive postures and peripheral adjustments on a vague instinctive basis. Such stirred-up organic states appear to the outsider as "emotional expressions"; they are known to the individual as "emotional experiences."

We have already seen how certain fundamental emotional patterns, those of resistance, content, startle, and gloom, are manifested at or shortly after birth. And we have traced the manner in which these primitive "wholehearted" reactions become graduated, transferred, and elaborated and combined to produce the richer repertoire of emotional conditions.

Adolescent emotionality, in so far as it assumes any distinct characteristics, is a matter of degree and intensity, and does not represent the birth of new emotional elements. On the one hand, as we have seen, there is a certain acceleration of bodily change, shown in the rapid growth,

the modification of proportions, the relatively rapid development of the reproductive system, and the correlated shifts in glandular activity which the functioning of this system entails. The changed and not readily understood accumulation of organic sensation blends with the primitive emotional modes of consciousness, and some of the intensity of adolescent emotion, when present, is undoubtedly to be attributed to these vague bodily changes.

Most important of all, however, are the relations of the adolescent boy or girl to the environment. Instinctive and impulsive dispositions mature, as do the bodily systems, on an hereditary basis. Their rates of development are not determined by the exigencies of modern civilized social life, but by the demands of that simpler environment of our forebears. Especially in modern life, and with the adolescent, "appreciation precedes execution." Sex impulses are urgent, and reproductive capacity at a functional level long before the "period of infancy" in modern life has passed. Personal inclinations, vocational ambitions, matrimonial plans, artistic aspirations, ripen by adolescence. But in the more intelligent portion of those individuals, years of inhibition, of constant thwarting and postponement must intervene, and many days of education, special training, and accumulation of capital, transpire before these impulses may be permitted expression.

It is this social entanglement, as much as the bodily changes, that entitles adolescence to the name "awkward age." It is in this way chiefly that arise those "frustrations," "oppositions," and "anticipated frustrations" of primary impulses, which, as Shand points out, are so deeply involved in emotional experience. The "awkwardness" of adolescence is far from being adequately repre-

sented by the pictures of motor clumsiness, which are easily and soon outgrown. There is "social awkwardness," occasioned by the inertia of institutions, which lag behind the need which they serve. There is "economic awkwardness" and prolonged dependence upon others, even for the simple necessities of food and clothing. There is "domestic awkwardness," due to the long detention in the parental home when native urges for mating and home-making are in readiness for functional activity. And the various modes of vocational, religious, philosophical, and literary awkwardness arise from the equivocal and uncertain way in which the more intelligent adolescents are weaned from the mother and enter upon the activities of the tribe or state.

This piling up of frustrations with their negatively toned emotions, accompanied by the more positive satisfactions that come with the increasing scope of experience and action, and by the visceral tensions of adolescent growth, adequately excuse youthful turbulence. And since emotional states may often be relieved by various substitutions, compensations, and "sublimations," the interest of the more gifted youth with expressive arts and activities, with music, literature, reform, and argument often gives rise to a productive fervor that is not easily equalled in the calmer moments of adult life. The lack of form and finish may be in such juvenile products balanced by depth of feeling and sentiment.

EMOTIONAL STABILITY

The assertion that emotional instability and maladjustment are characteristic of adolescent years is often made, usually on the basis of the same fallacious clinical

generalization that we have already considered in the case of the "only child." Neurotic tendencies and instabilities in childhood are likely to be overlooked or ignored, in the hope that as the individual grows up these characteristics will be overcome in the natural course of development. If they persist into adolescence, the problems they entail become more acute, and the prospect of their ultimate interference with the individual's career and domestic comfort leads to their serious consideration. Physicians are then consulted, and even though childhood history shows that the neurotic features are traceable far back into the individual's early life, they are likely to be recorded as having "culminated at adolescence." In other cases constitutional inadequacies may be actually aggravated by the delays, disappointments, and embarrassments of the earlier days of maturity. From the point of view of mental hygiene it is important that constitutional instability be recognized very early, for many of the adolescent difficulties arise from the failure to identify or correct unfavorable attitudes and types of reaction in early childhood. Emotional education, as we have seen, follows the same principles as that of the more linguistic type, and it should surely be begun fully as early as the latter.

The methods of identifying emotional instability and neurotic inclinations are far from standardized, and the diversities of emotional constitution are great. The beginnings of a systematic exploration of such character traits are represented by the "personal data blank" devised by Professor R. S. Woodworth of Columbia University, for use with army recruits.[11] This is a more or less standardized inventory of complaints and unfavorable

[11] H. L. Hollingworth, *Psychology of Functional Neuroses.*

reactions, patterned after the personal interview which the physician is accustomed to give in less systematic and more impressionistic form. Matthews [12] has applied a modified form of this inventory to 1,034 children of varying ages. The inventory is reprinted here, along with a table of results showing the frequency of such complaints in children of different ages. The "score" is the number of unfavorable replies, and the reply which is unfavorable in the case of each question is underlined in the inventory.

The table gives the 25 percentile, the median, and the 75 percentile for different ages, boys and girls being separately recorded. The median will represent the number of unfavorable replies to be expected of the average individual of a given age. For a score to lie between the 25 percentile and the 75 percentile means that the individual is in the middle 50 per cent or "normal" group. A score lying above the 75 percentile record is an indication of marked deviation in the direction of instability or number of complaints.

NAME..... AGE..... SEX..... GRADE.....

1—Do you like to play by yourself better than with other children?.....	YES	NO
2—Do other children let you play with them?....	YES	NO
3—Did you ever run away from home?.....	YES	NO
4—Did you ever want to run away from home?...	YES	NO
5—Do people find fault with you much?.....	YES	NO
6—Do you think people like you as much as they do other people?.....	YES	NO

[12] Matthews, "A Study of Emotional Stability in Children," *Journal of Delinquency*, January, 1923. (The inventory is reprinted here by permission.)

7—Does it make you uneasy to cross a bridge over water? ..... YES NO
8—Do you mind going into a tunnel or subway?.. YES NO
9—Are you afraid of water?..... YES NO
10—Are you afraid during a thunder storm?..... YES NO
11—Do you feel like jumping off when you are on a high place? ..... YES NO
12—Are you afraid of the dark?..... YES NO
13—Are you often frightened in the middle of the night? ..... YES NO
14—Do you have a light in your room at night?.. YES NO
15—Do you ever cry out in your sleep?..... YES NO
16—Do you talk in your sleep?..... YES NO
17—Do you walk in your sleep?..... YES NO
18—Are you troubled with dreams about your play? YES NO
19—Do you ever have the same dream over and over? ..... YES NO
20—Do you ever cry yourself to sleep?..... YES NO
21—Did you ever have habit of picking your fingers or your nose?..... YES NO
22—Did you ever have the habit of stuttering?... YES NO
23—Can you sit still without fidgeting?..... YES NO
24—Did you ever have the habit of twitching your head, neck, shoulders?..... YES NO
25—Do you break and tear and spoil things more than other people?..... YES NO
26—Do you ever get so angry that you see red?.... YES NO
27—Do you stumble and fall over things more than other people? ..... YES NO
28—Are you usually happy?..... YES NO
29—Do you ever feel that nobody loves you?..... YES NO
30—Do you ever wish you had never been born?.. YES NO

31—Do you ever wish you were dead?..... YES NO
32—Do you ever giggle over nothing at all?..... YES NO
33—Is it easy to get you cross over very small things? ..... YES NO
34—Did you ever have a real fight?..... YES NO
35—Do you like to tease a person till they cry?... YES NO
36—Can you stand pain as quietly as others do?... YES NO
37—Do you ever feel a certain pleasure in hurting a person or animal?..... YES NO
38—Do you feel that you are a little bit different from other people?..... YES NO
39—Do you seem to have a harder time to get along in school than other children do?..... YES NO
40—Do you ever feel that your parents are not really your own?..... YES NO
41—Do you ever have the feeling as if you were falling just before going to sleep?..... YES NO
42—Do you ever feel as if you were smothering?.. YES NO
43—Are you usually on time?..... YES NO
44—Do you usually feel well and strong?..... YES NO
45—Do you usually sleep well?..... YES NO
46—Do you feel well rested in the morning?..... YES NO
47—Do you feel sort of tired a good deal of the time? ..... YES NO
48—Do you feel bored a good deal of the time?... YES NO
49—Do your eyes often pain you?..... YES NO
50—Do you have many bad headaches?..... YES NO
51—Have you ever fainted away?..... YES NO
52—Does your family treat you right?..... YES NO
53—Do your teachers generally treat you right?... YES NO
54—Are you ever bothered by a feeling that things are not real?..... YES NO

55—Are you ever troubled with the idea that somebody is following you? ..... YES NO

56—Do you ever feel that someone is trying to do you harm? ..... YES NO

57—Does it make you uneasy to cross a wide street or open square? ..... YES NO

58—Does it make you uneasy to sit in a small room with the door shut? ..... YES NO

59—Do you usually know just what you want to do next? ..... YES NO

60—Do you have a hard time making up your mind about things? ..... YES NO

61—Do you have a great fear of fire? ..... YES NO

62—Did you ever have a strong desire to set fire to something? ..... YES NO

63—Did you ever have a strong desire to steal things? ..... YES NO

64—Do you think you have more fears than most people? ..... YES NO

65—Do you make friends easily? ..... YES NO

66—Do you get tired of people easily? ..... YES NO

67—Have you any very strong superstitions? ..... YES NO

68—Did you ever have a vision? ..... YES NO

69—Did you ever feel that you were very wicked? YES NO

70—Do you consider yourself a very moody person? YES NO

The median number of these seventy common complaints reported by boys and girls is between nine and twelve, approximately ten, and the range of the middle 50 per cent or "normal" group is from five to sixteen complaints. Less than five would thus indicate an unusually stable set of emotional attitudes of this sort; a score greater than sixteen, on the other hand, indicates an unduly "ailing"

TABLE XVII

MATTHEWS STANDARDS FOR AGE AND SEX

AGE	25 PERCENTILE		MEDIAN		75 PERCENTILE		NO. OF CASES	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
10..	6.0	6.0	18.0	11.5	23.0	17.0	27	12
11..	7.0	6.0	11.0	11.0	18.0	14.0	73	43
12..	6.0	7.0	9.0	14.5	14.0	21.0	102	90
13..	4.0	7.0	9.0	11.0	15.0	16.0	106	101
14..	4.0	6.0	8.0	11.0	13.0	17.0	73	108
15..	3.5	7.0	7.5	10.0	12.5	17.0	56	100
16..	3.0	9.0	6.5	13.0	10.5	19.0	35	43
17..	3.0	13.0	5.0	19.0	9.0	25.0	27	13

TABLE XVIII

MATTHEWS STANDARDS, TOTAL GROUPS AND SEXES

Sex	25 Percentile	Median	75 Percentile	Number of Cases
Boys	4	9	14	522
Girls	7	12	18	512
Total (Boys and Girls)	5	10	16	1034

individual. On the whole the scores for boys decline with increasing age; those for girls either remain unchanged or perhaps very slightly increase, although the high score at seventeen years is probably occasioned by the relatively small number of cases at that age. The difference between boys and girls is no doubt adequately explained by the social pressures which disincline boys to report such symptoms, and by the freer give and take of boys' play and other social relations whereby such inclinations tend to become mutually corrected. In girls, on the other hand, many of these little "emotionalities" are still tolerated, or

even encouraged by social expectation. Perhaps the most significant fact revealed by the table of scores is that there is no indication whatsoever of a piling up of these signs of instability at puberty or later in adolescence.[13] This is a further suggestion that the assertion of the common onset of emotional instability at adolescence is probably based on the exaggeration and generalization of clinical findings in exceptional cases. The question of the modes and incidence of more definite neurotic or psychotic conditions we may postpone for later discussion in connection with maturity.

[13] These results are confirmed by a recent report by Terman and Cady, who used a similar inventory with groups of normal and gifted children. (Terman, *Genetic Studies of Genius*, chap. xvii.)

CHAPTER XIII

MATURITY—VOCATIONAL AND DOMESTIC CAREER

THE RANGE OF DIVERSITY

The fact of human diversity is so important for developmental psychology that an early chapter has been given to that topic. In connection with each of the successive stages we have also had occasion to emphasize the fact that deviations from our account of "the average" are the rule. This fact of diversity in developmental initial status, in pace, and in final attainment, becomes increasingly important as age progresses, because the differences, becoming more apparent, are more commonly recognized and complicate human life. Benevolent families have in the past been willing to adopt *almost any* infant, apparently in the belief that all infants are more or less alike. The placing of adolescent orphans in new homes encounters greater difficulty, since it is fairly clear to any observer that these individuals are far from being equally lovable and full of promise. And when it is a matter of adopting an adult (as in marriage) the differences between individuals are of manifest importance.

The fact is of course that there are differences from the very beginning; some infants at birth are nearly twice as long as others, for example. But differences of an inch at birth are likely to mean differences of a foot in maturity. Differences representing a month of growth, in infancy,

will be represented by differences of a year or more in developmental status by the time of adolescence. It is not then, that differences are absent in early days; it is merely that differences of inches (in spite of Weber's law) are not so obvious nor so conspicuous as are differences of larger units, such as feet. And since developmental pace is a constant feature of individuals, the child of five years, with an intelligence quotient of 80 per cent will also have, at intellectual maturity by the close of adolescence, an intelligence quotient of 80 per cent. His standing in the group of his fellows remains unchanged; but a backwardness of 20 per cent at the age of five years means a difference of one year; while at the age of fifteen the same relative backwardness means a difference of three years. Thus children who differ by only one year in their capacity to learn to read and write, may differ by three years in their ability to learn algebra. Indeed a difference of one year in ability to learn to read may signify, in later life, so great a difference as that between ability to learn algebra and complete unfitness for that accomplishment. In terms of the length of human life and the amount of human patience, then, native diversities become more considerable as maturity is approached.

Furthermore, those differences between individuals which are due to special training, to social pressures of varying forms, to varying economic resources, nationality, epoch, and geography, tend to accumulate throughout life so that they also give greater diversity to adults. On the other hand, uniformity of such environmental pressures may in restricted groups contribute external resemblances (such as in vocabulary, speech, clothing, manners) by warping diverse native tendencies into a common mould.

For all these reasons our discussion of the period of maturity must lay special emphasis on the distribution of characteristics, rather than upon their central tendencies. In fact, failure to recognize these distributions of diversity leads to error in connection with any developmental period.

A POPULATION OF MATURE HUMAN BEINGS

Before any discussion of "the average adult" we shall therefore do well to consider what aspect is presented by a random sampling of the "adult population." To show that this method of approach might be used in connection with any stage of growth, consider the following tabulation of the lengths of newborn male infants, to which reference has been made in an earlier chapter. One thousand male infants, at birth, were found to have lengths, in centimeters, as shown by this table.

TABLE XIX

Length in Centimeters	Number of Individuals
Below 41	2
41 to 43	12
44 to 46	89
47 to 49	223
50 to 52	424
53 to 55	208
56 to 58	39
Over 58	3

Nearly half of these male infants are seen to measure from fifty to fifty-two centimeters in length at birth. But some are less than forty-one centimeters, and some are more than fifty-eight centimeters in length. (As a matter of fact one was only thirty-eight centimeters and one was as

long as sixty-two centimeters.) As we go, in the table, away from the median or average, between fifty and fifty-two, the numbers of individuals found at each step become fewer, so that the whole 1,000 give a distribution along the scale, piling up at the median or average measure and tapering away toward the two extremes. This feature of human diversity is not only true of this particular measure (length). It is true of all measures and of all ages of human life.

Now when we have measured and distributed a group of individuals for such a measure as length, we have not by this act also distributed them systematically for all their other traits. In spite of the fact that desirable traits tend on the whole to be found together (to be positively correlated), that individual who stands *just at average* in one trait does not by any means stand *just at average* in other traits. The man who is found to be of just average height, is by no means certain to have just the average income, the average education, the average intelligence, or the average sense of humor. Each trait must be independently measured, in order to learn what its own average amount is. There is probably no individual in the world who would be found to be just at *average* in all his traits. In talking about the "average adult" therefore we must be certain to have in mind *in what trait* the individual is at this station. We have seen that this is no less true of all developmental stages, and how the failure to do so merely leads to *more obvious* discrepancies in later stages.

Experience has repeatedly shown that a further warning is also necessary. The reader should not confuse "the average adult" with the average of his acquaintances. Any one who is able to read this book, or even to reflect

about the average man, is superior to him in mental equipment, and is probably relatively unacquainted with him. Relative mental levels are only clearly discerned when a general draft is made upon the whole population, as when the schools draft all children into the earlier grades, or when a war brings into military association large sections of the general population.

INTELLIGENCE OF THE ADULT

By the intelligence of the average adult we can therefore mean only the intellectual ability of an individual whose intelligence is of the average degree, without reference to his native sense of humor, his legally inherited fortune, or his educationally acquired skill in playing tennis. In order to describe such average intellectual accomplishment we should need to be very careful in our choice of material tasks or measures. It would be interesting if tasks could be used which no human being had ever confronted in their specific form; it is more feasible to employ tasks which practically every individual has had ample opportunity to encounter in the ordinary course of life.

We need not dwell long on the question of the definition of intelligence. If by it we mean "capacity," we should need to measure every possible type of performance (jumping, singing, writing poetry, playing bridge, and so on) and state the individual's average of standing in all these performances. We mean something more limited than the average of such an endless array. We have seen that the essential feature of mental activity is the operation of symbols, through the redintegrative mech-

anism. *Capacity for dealing with symbols, under the influence of a symbolic context,* is perhaps the best definition we can give of intelligence in the sense of "mental ability." Of course there are many other forms of ability, and many of them are often confused with intelligence, even in psychological and educational literature.

Information concerning intelligence, as thus defined, is to be secured in various ways. Occupational fitness is one good index. Thus the army data showed that a test rating of less than C on the test forms employed was characteristic of those who had been, through rough economic and social selection, occupied with raw materials, with animals and plants and their care (teamsters, miners, farmers, horseshoers, concrete workmen, and the like). Such direct activities call for little symbolizing activity.

Men engaged mainly with simple instruments, implements, and tools, calling for no occupation with symbols, but being at least a stage removed from dealing with raw materials, averaged C in the tests (telephone operators, automobile mechanics, painters, carpenters, bricklayers, machinists, telephone linemen, bakers, and the like).

Averaging C plus were those activities in which simple forms of symbolism were involved, but little management of symbolizing organisms (other people) was called for (filing clerk, bookkeeper, telegrapher, band musician, shipping clerks, stock keepers).

When the occupation with symbols became more pronounced, and working with other people (symbolizing organisms) entered (as in stenography, dentistry, medicine, Y.M.C.A. work, draughtsman, civil-engineering) a rating of B was found to be the average. And in high-grade professional activity and work dealing largely with human

management (army chaplains, engineering officers, professions) a rating averaging A in the tests was found.

Paralleling such indications, we might use ability to handle the work of the school curriculum as a criterion. For such work is largely in terms of linguistic and other abstract modes of symbolism. Or we might use simple performance in such arrays of mental tests as have been devised for intelligence measurement. Indications of developmental pace would also serve, especially in such processes as are more complex, functional, and symbolic. We have already seen how the educational, the linguistic, the occupational, and the developmental limits of the idiot, imbecile, and moron run in parallel ways.

In the chart on page 275 we have shown what a random selection of the adult population would be like in intellectual respects, so far as available knowledge discloses this in something like measurable terms. The distribution is similar to that of the length of infants at birth, the *average man* (intellectually) being taken to mean the middle 50 per cent of the group. On the graph are represented in terms of occupational level, school capacity, developmental limits (mental age), and test measures, the various groups readily distinguished. The relative numbers of individuals in each of these rough groups are also indicated.

THE AVERAGE MAN

Bearing in mind, henceforth, that by the "average man" we can mean only the individual who is at the average measure in that particular trait under discussion, we might build up a hypothetical picture of a person who in a great many such respects stood at the average posi-

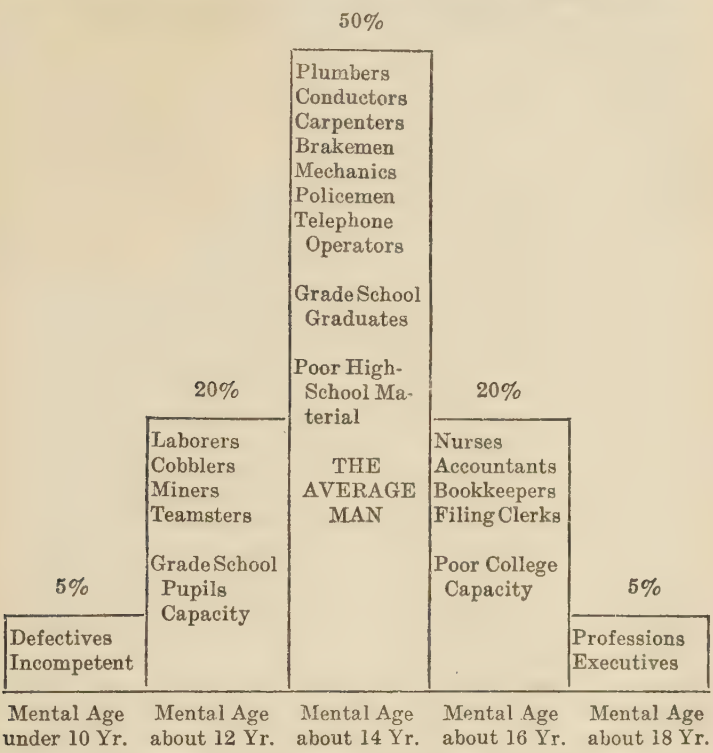

FIG. 19.—SCHEMATIC GRAPH, REPRESENTING THE APPROXIMATE RELATIVE FREQUENCY IN THE POPULATION AT LARGE, OF THE FIVE SIGNIFICANT DEGREES OF ADULT MENTAL CAPACITY, AND INDICATING THE MOST FAVORABLE TYPE OF OCCUPATIONAL AND EDUCATIONAL CAREER.

The results here portrayed are a combination of the army data with figures from other studies of occupational and educational groups. The occupations cited are suggestive only. Data are available on many more types of work, and there is much overlapping of different occupations, and a considerable spread in the case of each.

tion. If in every possible respect his measures were those of the average, we might describe such a hypothetical average man in something like the following way.

This hypothetic individual, if a man, would be about sixty-seven inches tall and weigh about 150 pounds; if a woman, about five inches shorter and several pounds lighter. The brain weight would be about 1,300 grams, about 2 per cent of the total weight of the body. The pulse would beat about seventy times a minute under ordinary resting conditions; eight to nine hours a day would be spent in the stupor of sleep; death would come not later than the fifty-third year. Such an individual would leave school at the eighth grade, with a working knowledge of the "fundamentals," a smattering of local geography, a bit of history, and a few elementary facts of physiology. There would be no knowledge of a general kind in such fields as literature, civics, science, politics. The individual would speak only his mother tongue, and would be intellectually unable to do satisfactory high-school work of the traditional kind.

He might, if a male, through apprenticeship or after a short period of industrial training, become a plumber, a carpenter, a policeman, a mechanic. He would have a vocabulary of about 7,500 words, a little over half that of the ordinary high-school graduate. If a woman, she would be a competent housekeeper or plain nurse, or a mediocre or inferior clerical worker.

Since, according to government reports, only about 2 per cent of the population paid federal income taxes in 1926, the economic status of average men and women would be humble. Marrying at a fairly early age, they would have from three to five children, and would support

such a family on an income which, at least until very recent years, was not greater than $1,000 annually. Upon being given intelligence tests of the standardized sort, involving literate performance, the score received would not significantly exceed that which would be made by average adolescents at their fourteenth year. Such an average adolescent is characterized by the following typical responses in the Stanford-Binet test.[3]

He can probably explain what such words as "nerve," "insure," "shrewd," and "peculiarity" mean, but would experience difficulty or failure when attempting to define such words as "coinage," "charter," "dilapidated," and "philanthropy." He can give the three chief differences between a president and a king, but does not know the difference between poverty and misery or between revolution and evolution sufficiently well to give a satisfactory explanation.

He can tell how many pencils can be bought for fifty cents if two pencils cost five cents, and how much seven feet of cloth will cost at fifteen cents a yard, if allowed one minute for each problem. But if told that in a large box there are four small boxes, each containing four smaller ones, he is unable in a reasonable time to tell the total number of boxes in the collection. He can explain what a simple picture means, but is still unable to tell what more than half of the simple fables, which he is told, are supposed to teach, in a manner which suggests capacity for generalization from specific instances.

He has a memory span for seven digits, and can repeat from one hearing a sentence of sixteen to nineteen one-syllable words, such as: "It is nearly half past one o'clock;

[3] Terman, *The Measurement of Intelligence.*

the house is very quiet and the cat has gone to sleep." But he fails on larger numbers of digits and on longer sentences. He can show you, by drawing the path with a pencil, the best way to hunt for a ball lost in a field, but he cannot explain the difference between character and reputation, nor between laziness and idleness.

The beliefs of the average man have not yet been adequately inventoried. But it has been shown [2] that many college students accept as "correct" such statements as: "Many eminent men have been feeble-minded as children." "Any physical or mental disease can be contracted by thinking about it," and "People born under the influence of certain planets show the influence in their characters." More than half of those questioned believe the first of these, and a fifth of them believed the last. If college students adhere to such nonsense, it is quite probable that the average man would believe firmly such statements as:

Everything that the books and advertisements say is true.
Some numbers and some days are unlucky, but he was born under a lucky star, and is immune to these effects.
Lightning never strikes twice in the same place.
Darwin believed that men had descended from monkeys.
As a boy he was the best athlete in his neighborhood.
The Ouija board communicates messages from the dead.
He can stop smoking without difficulty any time he likes.
His dog has more intelligence than the average man.

In spite of these meager endowments, it is the average man and the average woman that most often marry, become parents, are the autocratic dictators of a family of

[2] Nixon, "Popular Answers to Some Psychological Questions," *American Journal of Psychology*, July, 1925.

children, determine the results at popular elections, become the members of school boards and the mayors of cities. It is these individuals who, under the laws of heredity, will determine the caliber of the coming generations, except as this is pulled still lower by the large families of those inferior to them and the smaller families of the more intelligent. That they do not originate the measures for which they vote, invent the machinery they operate, or plan the curriculums they authorize, shows that, in spite of numbers, it is the contribution of the superior endowment that determines the course, although perhaps not the pace, of social development.

The reaches of superior endowment in adult life we shall not seek to characterize.[3] Rolls of honor, halls of fame, directories of biography, lists of eminent men and women, the characters of history, the membership of learned societies, captains of industry, masters of techniques, inventors, leaders of humanity in every field, creative workers, originators of ideas, the list could be extended to any length. The diversities defy brief summary of the degrees and idiosyncrasy of talent. But we know that at least in some respects, and usually in many, these distinguished beings stood exceptionally high in the distribution of human capacities. No less numerous are those falling markedly below the average, in the direction of incompetence.

We have, in this account of the "average man," given most attention to the mediocrity of intelligence. It would also be of considerable interest to have an approximate description of the activity level and the emotional equip-

[3] H. L. Hollingworth, *Judging Human Character* and *Vocational Psychology*.

ment, of the average degrees. These have not, however, yet been studied in quantitative ways to an extent which permits such a description. The manual skills become specialized according to the individual's occupation, and standards of "general motor dexterity" have not been formulated. Nor can we portray pictures of average honesty, typical thrift, representative courage, median patience, modal self-esteem, nor mediocre susceptibility to insult. That in the near future developmental psychology will have available such pictures is quite probable.

Nor has success attended the attempt to provide convenient categories for representing the general temperamental or character make-up of individuals. Classifications of "temperament" obviously select extremes, and we can be sure only that the average individual conforms to none of the announced "types." The average temperament is neither sanguine nor melancholy, neither bright nor dark, neither introvert nor extrovert. It is neither sick nor well, but only "ailing"; neither bright nor dull, but only mediocre. The great error is that of taking the "upper half" of the distributed group to represent the desirable, hence the normal, therefore the average human status. This leads only to faulty hope of individual responsibility, and to erroneous expectation of social change. Developmental psychology can present no more wholesome lesson than that "the normal is the mediocre."

INSTITUTIONALIZATION

The leitmotif of the average adult is a monotonous chant; its keynote is that of some human institution. Institutions are the shadows of men long since departed;

they exist only retrospectively, and subsequent to the facts which they describe. Institutions are inert, they are merely descriptive and historical; they do not themselves *do* anything. Instead they are convenient descriptions of what individuals have already done. The institution does not exist until the facts which it describes have already occurred. The acts are the acts of people, but these acts have certain resemblances, and to these various resemblances we give the names of institutions. The resemblances represent common modes of habit formation, and habits are most often acquired by the on-coming and impressed by the departing individuals.

The institutionalization of the adult is his most striking psychological trait; it is even the common denominator of his varied acquired diversities. In the main his ideas, his acts, his urges, and his constraints, are so shaped as to conform to those patterns or historic models, the institutions. As he moves into maturity the typical adult becomes less and less of a personage, and more and more a citizen. Just as the germ cells of his parents determined the general lines of his physical frame, so the network of society fixes the general lines of his mental structure, the patterns of his conduct and experience. It is quite as unusual for him to escape the latter as it is for him to vary from the former. And just as "heredity" is an abstract statement of the fact that individual germ cells determine structure, so "institutions" or "society" are the abstract ways in which we indicate the facts of personal training and agencies in their shaping of mental identity.

Heredity does not *do* anything, nor does gravitation nor electricity. These are descriptive and summary terms for the concrete events that actually occur. In the same

way property, clothing, the state, the law, the school, labor, capital, actually *do* nothing. They are the abstract names we use, in retrospectively summing up a series of events that has already transpired. The nation does not will, nor the church inspire, nor the school educate; neither does labor disturb nor capital oppress. The acts and thoughts are always those of individuals. The germ cells do not deliberately seek to perpetuate the type, nor do parents and teachers deliberately seek to perpetuate institutions. Each acts according to its own original or acquired traits, and when the acts are completed we find heredity in the embryo and institutions in society. It is not the task of psychology to pass upon the merits or demerits of these facts, any more than it is the province of biology to criticize the technique of reproduction. It is our task only to exhibit the sources and the mechanism of socialization in the adult.

In earlier years individual urges and constraints have been in the main personal. The urges are the child's own impulses and appetites, and the wishes of relatives and teachers, together with the suggestions of literary and historical characters, and of playmates. The constraints have been in the main personal affections and sympathies, parental control, and the police regulations of the school and street. To be sure, the condition is far from being wholly individualistic; one is a social being from the very beginning. But the social relations have a marked personal flavor. One is the member of a family, rather than a citizen; of a ball team, rather than of an army; an obedient son or pupil, rather than a taxpayer.

Emphasis in childhood is on the personal relation. The boy fears not so much the law, as the policeman; he pur-

sues not knowledge but the daily assignment; he craves not justice, but his own comfort and "rights." It is not the group welfare but the individual satisfaction, not institutional respect but fear of individual authorities, that constrains. His gods are personal gods, and his goods are personal also. This is in part what leads us to characterize youth as a time of play rather than of work. We contrast the joys of childhood with the duties of maturity.

Now these personal motives, as we shall see, are far from being absent in maturity; nor are impersonal and abstract factors entirely wanting in youth. They do not suddenly appear with the attainment of majority. They have been forming from the very beginning, but they have usually been supported by personal warrant, and their impersonal aspect has not been conspicuous; they have often operated through people rather than through names or concepts. In many cases they may continue to do so until a relatively late stage or even throughout life.

But once habits of conduct are formed, they have an inertia of their own. They are given names, and to these names there is easily attributed a superindividual warrant which takes the place of the personal warrant that served throughout childhood and gradually weakens during adolescence. The common and similar habits of associates, being observed and named, are accorded a certain respect *as such*. Habits which have thus lagged behind the need which gave rise to them, also lag behind the occasion which justifies them. They may to be sure serve new needs, but it is habit-inertia that gives rise to institutions.

CLOTHING AS AN INSTITUTION

A few typical examples will serve to illustrate the standardization of the adult. Conventionalization does not wait for maturity, to be sure. Children's plays and games become fixed and named. They have their proper seasons, which are respected and further conventionalized by the toy dealers. There are established "ways" of jumping a rope, of diving, of playing with marbles. Tops, kites, and bonfires follow the calendar rather than the climate. But standardization reaches its climax in the play and work of maturity.

Carlyle described the typical human being as "an omnivorous biped that wears breeches," and chose the garment as the distinguishing feature. The habit of clothing is begun at the moment of birth. The first step of parent or nurse is to wrap the infant in swaddling clothes, to conceal his person, and to limit voluntary movements. But it is not the institution nor the concept of clothing that starts the clothes-wearing habit. Nor is it the custom nor the law that first compels one to dress. It is the individual parent or nurse. But by maturity clothes habits are established, the body has become adapted so that clothes are required for personal comfort, clothes are used as the chief mode of personal ornament, and ideas and emotions have so developed about the exposure of anatomy that in spite of adolescent radicalism, clothes continue to be worn. The radicalism expresses itself weakly in trivial innovations of style, length, color, and fabric. Few adolescents and fewer adults question the institution of clothing itself.

Minor choices the individual is allowed. Current innovations and fads he is permitted to initiate. But all such

liberties are within limits. The woman may wear shoes, or slippers, or sandals, but her feet must be shod. She may wear silk or gingham, wool or fur. Her garments may be elongated, abbreviated, opaque, transparent, abundant or scant, but garments they must be. In the heat of the kitchen, in midsummer, in the stupor of sleep, even when dead and buried, the human form must be draped.

Personal influence is used to foist the institution of clothing upon those averse to it. Thus in 1920 a measure was introduced into the Philippine Territorial Senate providing that the government should buy trousers at wholesale and distribute them free to inhabitants of the islands because, according to the sponsor of the measure, "The appearance of half-naked pagans is a most shameful exhibition, and is capitalized by the opponents of Philippine independence as demonstrating the incapacity of the Philippinos for self-government."

The custom of clothing is thus found. It is itself a product, not a force; it is a descriptive generalization. Adults resemble each other in wearing clothing; this fact of resemblance we call custom. But clothing must be worn before the custom exists. The custom is not an agency; the agencies are personal, the personal acts of individual nurses and parents, the personal habits of the clothed persons. Each individual wears clothes because of his own personal history, just as he digests in his own stomach. People do not first imitate each other, and therefore wear clothes, any more than they imitate each other because their sleep or their digestions are similar. Custom no more produces clothing than it does sleep or digestion. Custom is the retrospective or historical fact that individual habits are similar.

PROPERTY

Property does not originate as a concept or power, and individual ownership thereupon ensue, any more than graphic communication waits upon the invention of an alphabet. Property is first encountered in the clash of individuals. Responses become limited, even in infancy, to a few objects, to those which do not provoke personal encounter and defeat. Property is a word used to indicate this limitation of response, in its more conventionalized form. By maturity the individual is so fixed in these observances that he discovers the "property concept." Within the limits set by his intelligence, his training, the urgency of his needs, and the strength of his fears and respects, he continues these habits and the institution of property is the *result,* an abstraction after the fact.

By this we do not of course mean that the fact which it describes is unreal. The concept itself, the very application of the word to a situation, becomes potent to determine action, as a surrogate for personal reproofs, admonitions, punishments, and threats of parents, playmates, teachers, and officers of justice. But it is the concept, not the institution, that exercises this power, and concepts are occurrences in individual persons.

Such concepts may become institutions and then fetishes, as if they were in themselves objects of reverence and sanctity, just as acts may be shunned as if they were in themselves wrong. Institutions which originated as means may in themselves assume the status of ends. They are easily assumed to be "natural," since their origins are obscure, or they are characterized as holy, inspired, or divine in origin. The genetic history of institutions does not

of course determine their present value; it may however greatly aid in intelligent evaluation.

THE FAMILY

Such facts are well illustrated by the family, a custom or institution that is early discovered. The babe is retained by its mother, housed with brothers and sisters, and the father sleeps at home and exercises personal authority, even in conditions of primitive life, and in the life of animals lower than man. All are fed at the same table, and are given a common name. The children first play in "our yard," showing the early blending of the property and the family concepts. The common revenue, the mutual dependencies, and the ensuing attachments and habits of respect, easily carry the institution or set of habits beyond the initial need which they were designed to serve. The individual's habits thus become determined. Toward his own offspring these habits are directed. But they are directed before the concept of the family is formulated by him. He may die of old age without ever clearly formulating to himself just what a family is, or why it exists. The family is the abstraction of the onlooker. The actual events are the individual acts and habits. The institution is a description after the fact; the child encounters, not the family, but individuals with their fixed habits.

Such institutions the individual perpetuates, with some disregard of their relations to his present needs, providing they do not overmuch hamper him and thwart his purposes. He may even sacrifice current impulses under the coercive constraint of the older habits. In this way in-

stitutions, typical habits, may be prolonged beyond the social needs which originally justified them. This is what we mean by the institutionalization of the adult.

PREFERENTIAL AND ASSORTIVE MATING

In connection with the establishment of the family, a certain interest attaches to any influences which control the selection of those who are to become the parents of the next generation. A number of studies have been made of possible preferential and assortive tendencies in human mating. A most informative summary of the results of these studies is given by Holmes.[4]

By preferential mating is meant the greater tendency for those with certain traits to mate than for those without these traits. Thus Darwin supposed that definite male and female types tended to be emphasized and perpetuated by preferential mating, both among lower animals and among human beings. It seems at least evident that men choose women for somewhat different reasons than women select men, although the criteria may vary from age to age, and from epoch to epoch.

A study by Shinn showed that women in coeducational colleges are more likely to marry, and at an earlier age, than are those educated in segregated schools. But we do not know how much of this effect is due to coeducational influence and how much to initial selection in enrollment. In a study by Gilmore, women normal school graduates were graded for personal beauty on a scale of 100 points. Those grading eighty and over had a higher marriage rate than those grading lower, the rate declining

[4] Holmes, *The Trend of the Race*, chap. x.

with the grade of beauty. From the point of view of school marks, those between sixty and seventy had a higher or more rapid marriage rate than those averaging between seventy and eighty. If there is a tendency for women of greater beauty and lower academic accomplishment to marry more frequently or earlier than others, this would be an example of preferential mating. Pearson reports that light-eyed people marry more frequently than do the dark eyed. The significance of preferential mating lies not in the destiny of the individual but in the fact that the indicated trait may tend, if hereditary, to be more definitely propagated and thus socially preserved. Various statistical fallacies are likely to complicate such studies. Thus the oft-asserted fact that highly educated women marry less often or later than others, may not point to any educational influence, nor to any decline in "racial stock." We must first know whether there are, among highly educated women, a greater number of those who would mate late or not at all, under any circumstances, before we can draw any conclusions.

By assortive mating is meant the tendency for like to mate with like, or with unlike, as the case may be. Such tendencies, if present, might incline to produce "types" in the population, rather than the ordinary distributions which we more commonly find. Assertions of the existence of assortive mating tendencies have seldom been adequately supported by reliable evidence. Thus Alexander asserts but does not present any evidence for "that curious law which ordains the attraction of opposites in mating, and so maintains nature's average." Lester Ward also referred to a "law of nature that partners choose their opposites." The fact is, however, that such evidence as

is available points directly against the existence of such a "curious law."

Thus Fol studied photographs of married pairs, classifying them as "similar" or "dis-similar," in appearance. He found that 67 per cent of the young and 71 per cent of the old were "similar." This is, to be sure, a loose type of investigation. But other data are somewhat more definite. Galton showed that parents of English men of science were notably similar in temperament, eye color, and hair color. Pearson found that light-eyed men and women, and dark-eyed men and women, more often married those of their own trait, and that those of similar rather than of different stature were more likely to mate. Ellis confirmed these tendencies for stature, and found the same true for complexion, but his cases were few in number.

Holmes's [5] account of the assortive influences is instructive. He notes that tubercular tend to mate with tubercular, and deaf with deaf. This may be due in part to common affliction and sympathy, in part to propinquity in hospitals, sanatoriums, and the like. Feeble-minded mate more frequently with those of low intelligence. Holmes points out that in general, among people of a grade higher than the defective, "mediocrity mates with mediocrity and superior types tend to select their mates among the superior. Common standards, agreements in tastes and similar educational attainments doubtless have a marked effect in bringing about unions betwen those of similar inherent endowment." Brimhall found that "a distinguished man of science is at least 200 times as likely to have a distinguished wife as a man of the generality."

[5] Holmes, *op. cit.*, chap. x.

INSTITUTIONAL PERSISTENCE

In a later chapter we shall be particularly interested in an analysis of the origin and perpetuation of institutions. At the moment we may only call attention to the tenacious way in which they survive. The human being wears clothing in midsummer, preferring bodily discomfort to the sense of isolated habits. He buys an engagement and a marriage ring, without even the remotest conception of their original significance. He teaches his children to use the right hand preferentially, long after they have ceased to employ spear and shield, even at the risk of bringing nervousness and speech disturbance upon them. He puts artificial pillars in front of steel buildings, although they in no sense support the weight of the structure; he represents false beam ends along the cornice when the realities back of these appearances have long been supplanted by other structures.

He clips the heads of his boys and braids the hair of his daughters, wears buttons on the back of his Prince Albert and on the cuffs of his coat, puts artificial mantels and dead fireplaces in his steam-heated apartments, just as he bears a useless appendix, develops useless ear muscles, tonsils, tail bones, and gill slits. He asks a perfunctory grace before eating, little realizing the fears that originally prompted his forefathers to this ceremonial; he christens new battleships with grape juice and sends Christmas presents and birthday gifts with ungracious disregard of their primitive meanings. As we shall see later, institutions in group life in many ways resemble the instincts attributed to the individual. Some account of their motivation is an essential part of developmental psychology.

THE CONCEPTS OF "RIGHT" AND "WRONG"

We may at this point consider one more important institution, one that begins to develop very early in individual life. In spite of its obvious personal origin and individual basis, it in time assumes an abstract and descriptive character, and is often asserted to be something more than a concept, namely, a "conscience." This is the institution of evil, involving the concepts of right and wrong. It is represented individually by the conscience of each; civically by the police force and the courts; collectively by public sentiment; socially and ethically by the code of morals of the given group.

In individual life the limitation of conduct at first appears in the form of natural punishment. Things tipped over are broken; objects dropped into the river are lost; kittens too roughly handled run away; frightened birds disappear; lax coördinations involve falls and bruises. If life were long enough and people patient enough, this course of natural punishment might constitute an ideal process of character formation, without artificial repression or forced modes of action.

But life is short; playmates and adults are not long-suffering and the penalties of ignorance affect not only the individual himself, but also bring pain and unhappiness to others. Natural punishment would suffice only for Robinson Crusoe on an isolated island; even there human happiness might be increased by preliminary instruction. Hence early in life a series of artificial checks and stimuli is presented. Baby is petted for certain acts, scolded or punished for others, not by natural consequences alone, but by his determined and farsighted parents.

An arbitrary system of taboos and rewards thus becomes established by the elders.

Certain acts, it is soon learned, may be executed with approval or reward; others are under no circumstances tolerated, or are followed by pain or deprivation. There exists also a certain neutral array of acts. The approved acts are early grouped together under such categories as "good" and "nice." The tabooed acts are similarly classified under the captions "bad" and "naughty." The basis of the classification is purely perceptual; "Mamma does not like"; "Papa will spank"; "The bad man will get you." Still later the two large groups are designated as the "right" and the "wrong." The indifferent acts are not of sufficient importance to be given an early ethical name, or they are tentatively included under the acts that are all right.

The application of these terms "right" and "wrong," and, later on, such subdivisions as cruel, kind, gentle, rough, honest, dishonest, ethical, unethical, and the like, constitutes the second stage of "moral progress." On the one hand it is the beginning of law, and on the other hand the beginning of moral concepts, class names for acts. As experience continues, other personal authorities become involved, the teacher, policeman, preacher, priest, philosopher. On a somewhat more developed level "the law" is also recognized. But unless mental insight develops beyond this plane "the law" is likely to remain only a convenient word to indicate the personal authorities in general, and their relentlessness. But authorities in general do not become general authority, any more than people in general become general people. The taboos and the sanctions are concrete and personal, and at most

the law, on this level, is a set of rules, the statutes and ordinances.

Asked if the individual on this level "understands the nature and quality of his act" and whether "it is wrong" (as the court inquires of its experts), we must reply that he probably understands its nature, descriptively considered; he can tell what he did, and that he did it. He may even know that "it was wrong," that is, "one of those things folks do not want you to do." Right and wrong are here similar to the popular categories of hygiene. Certain foods are "good for one," others are "bad," because the doctor says so. There is no insight into the wherefore, such as a physiological chemist or a dietitian might possess.

The institution of the law thus first exists, in individual experience (we are not referring to legal history), as an array of persons with their expressed taboos and sanctions, their intentions and powers of punishment and reward. In less established cases this shows itself as "public opinion" or "public sentiment." It later exists as an array of prescriptions either written or unwritten, with assigned punishments on the one hand and a vague set of unwritten hopes on the other. Naturally enough it is readily felt, on either of these levels, that if authorities can be evaded or acts concealed, the wrongness is eliminated.

A third stage is represented by the noting of common elements among these groups of right and wrong things and the inclusion among them of other specific acts of like kind, not definitely stipulated. The concepts of right and wrong thus arise before the nature of transgression or that of virtue is understood. Either things are "in them-

selves" wrong, or are wrong because of authoritative pronouncement.

It often develops that taboos are inconsistent with one another. Thus it is wrong to be a "tattler" and also wrong to conceal another's crime. But which is "more wrong"? The concept of "degree of wrong" thus invites consideration of the *nature* of wrong. Fairly late, then, it comes to be appreciated that right and wrong arise out of conflict of individual interests and that the true quality of an act rests on its final or presumed consequence, to all concerned. The "law" on this level represents an expression of the best conclusions of the generations preceding as to the way to eliminate those forms of conduct inimical to the presumed best or highest comfort and destiny of those who might be affected by an act. The welfare of the group as a whole, in its concerted effort to survive, to grow, and to conquer, comes to define the nature of right and wrong.

The establishment of laws, the machinery and personnel of the police and the courts, thus become an institution which persists while the individuals and elements that actualize it constantly change. It is a *form* of organization that makes the institution. Historically or in retrospect it may be considered as a force or power, and the "arm of the law" conceived as a concrete agency. But psychologically the law is an abstraction. It does not exist until the facts it describes have occurred. The actual force is not the law as an institution, nor as written records, but, instead, the habits of individual people, on the one hand, and the concept of law, in individual minds, on the other. The institution is the fact that these function in a given way. If the laws of the Medes and Persians are

immutable, this means only that individuals are inflexible and relentless.

That which gives the law its objective appearance is the inertia of its machinery, the tardiness of its adjustments, and the fact that it does not express the habits and desires of all the members of the group, but only those of the majority, or the elders, or the monarch, or the parent. Because of its machinery, individuals are checked, regardless of motive and circumstance, and what we call "the will of the group" is substituted for the whim of the individual. The draft law takes the place of voluntary enlistment. Hence laws must often be changed. Because of the historic character of the institution, the law is declared or formulated tardily, after the ideas which it embodies have long been effective or approved. For the same reason it persists after the sense of individuals repudiates it. The need for law rests on human diversity. Except for the fact of human diversity, it is doubtful whether its mechanism would ever have developed.

THE INSTINCTS OF MAN

The reader may have wondered why so little attention has been given, in this developmental account, of "the instincts," those modes of conduct which are often said to be the "prime movers" of human activity. The reason is that we believe that the nature of human instincts has been grossly misconceived, and their rôle exaggerated, in the interests of a certain "animistic" bias in psychology. Instincts are like institutions. They exist after the facts, rather than before them, and can be only used in a descriptive, not in an explanatory rôle, in the usual circum-

stances. Instincts are the effects of development, not the causes. Since so much emphasis has been put upon instincts in the social life of human beings, it may be well briefly to state the conception here entertained.

Suppose that primitive man had found it useful to carry a cudgel, in order to survive. Presumably those would have survived and prospered who bore the stick most willingly, securely, and satisfyingly. We might thus, by selection, the presumed mode of origin of instincts, have a race of stick-bearing animals. Civilized men actually show such inclination, a cane-carrying propensity. Most men derive a certain satisfaction from the feel of a walking stick in the hand. They buy them, spend hours making them, carry them even when they are a great inconvenience. Clearly such an act is vestigial and of little present utility. What is the nature of such an inclination?

Is it a "cane-bearing instinct"? Does it, as instinct, lead men directly to the act that fulfills its purpose and satisfies its motive? Or does the nature of this act have to be learned? Surely the latter. All that we need at most to assume is the possession of a mechanism (the hand) adapted to this act, and a vague unrest (consisting of the activity of this hand) which persists until the cane-bearing act is hit upon. Thereupon the motive is satisfied, that is to say, the vague unrest is allayed. The satisfaction of the motive consists in the removal of the stimulus.

But to say that man is born with a lively hand, a sensitive palm, and a vague manual unrest which cane-bearing will annul, is very different from attributing to man a "cane-bearing instinct" in the sense in which "in-

stinct" is commonly employed. The vague unrest may moreover be satisfied in many ways, by various surrogates for the cane, such as a tennis racket, a baseball bat, a pocket. Men who "go in" for tennis and baseball are seldom seen bearing walking sticks. Shall we say that the cane-bearing instinct has been "sublimated"? Or is it not better simply to say that the vague manual unrest has been satisfied, this time in a nonmilitary fashion?

The typical human instinct, in other words, is not a specific pattern of activity originally determined by neural patterns laid down by heredity in the brain. It is a vague unrest, based on the incipient functional activity of some organ or mechanism, which may be satisfied in any way which occupies the restless member.

The sex instinct is such an activity. There is a definite mechanism, neuro-muscular, glandular, and vascular, which is easily stimulated to incipient activity. This preliminary activity is impulsive, constitutes a vague unrest, and the various possible modes of removing or satisfying this motive must be learned by experience. The parental instinct also is such a vague unrest which may be satisfied in devious ways, by fathering movements, by mothering chickens, by rearing children, by leading armies, writing poems, and a host of modes of exhibition. And it is no less ridiculous to call rearing children a sublimation of the "literary libido" than it is to characterize creative writing as a surrogate for parental occupation.

Gregariousness arises from the constant association, during infancy, with others, and the early establishment of habits of finding others in the environment. In later life these adaptations persist, and a vague unrest is present when their objects are missing. In the same way the

chronic smoker experiences a vague unrest when his pipe is misplaced. But this does not entitle pipe smoking to be called a human instinct. Birds, having wings and their various muscular attachments, flutter these organs. The result of this functional activity of specific organs is flight. The mode of flight is further determined by the more specific neuro-muscular structures, and by the habits acquired in their exercise. What birds have is not a "flying instinct" but a set of adequately equipped wings.

Instincts, therefore, we may consider as only those most general modes by which man's various forms of unrest may be relieved. The modes of unrest depend on the presence of specific organs and mechanisms. In some cases only limited forms of activity can allay the unrest of these mechanisms (as in eating and sleeping). In other cases a great diversity of activities may result in the annulling of the stimulus, and produce satisfaction. The particular forms which these activities take in human life, such as collecting, building, exploring, fighting, courting, and the like, are the result of extrinsic determination, of taught practises in the form of institutions, of environmental limitations (as of food supply, ornament, and the like). If the universe were so full of every commodity that merely by reaching into the air one could pluck down whatever object, food, toy, decoration, he might find it in his heart to desire at the moment, we may be sure there would never appear in human life those typical modes of activity which have been named "collecting instinct," "property instinct," "jealousy," and the like.

The use of instinct names for those various classes of behavior which man's bodily equipment and the nature of his environment lead him commonly to adopt may

serve some convenient end. But when these names are then endowed with the power of producing those activities, or are considered the names of "energies" or "dispositions" of a wholly mystical character, this is only a flight from descriptive science to a form of primitive animism. The "instincts" of lower animals lead them to definite series of specific acts. The "instincts" commonly ascribed to human beings do not; they lead, through learned activities, to the allaying of more or less recognizable and localizable forms of bodily unrest.

ADULT CONSTRAINT AND PLAY

The institutionalization of the adult implies, for one thing, that a large share of his activities are carried out under constraint. The constraint of self-support and support of family entails economic and vocational responsibilities which usually weigh heavily and dictate most of adult activity until a late age.

The constraint of morality and the restraints of the law impose upon the adult strong control of his detailed acts, his speech, his companionship, his dwelling place, his carrying of firearms, his financial obligations, even what he shall wear and drink, and where he shall spit, are more or less prescribed by institutional standards.

The constraints of early habits remain even after he has rejected the doctrinal beliefs which dictated their formation and inculcation at the hands of early teachers and parents. This constraint, along with the body of present and justifiable habits, constitutes the phenomenon of conscience.

The constraints of bodily infirmity, sickness, physical

handicap, are more and more onerous, now that they interfere with the ordinary responsibilities. The constraints of community action and group decision call him to enlist, to be drafted, to fight, to pay heavy taxes, and otherwise to violate his personal inclinations. Moreover, there are, as the result of personal choices on the part of the individual, and voluntary attachments and affections, various conflicts of values between these acquired tendencies and various distinctively human drives and inclinations.

To effect an adequate adaptation and organization of all these tendencies is what constitutes the development of a balanced adult personality. Individuals differ markedly in the degree to which they achieve this balance, and the particular form of maladaptation gives us the various character types studied in psychopathology or portrayed in literature. Individual and momentary failures provide us with many of the characteristic episodes of adult life. By way of illustrating what is here meant we may briefly consider the play activity of adults.

As we have seen, the plays of infancy are mainly the active exercise of bodily impulses, motor tendencies, and organs and mechanisms with which the individual is equipped by heredity. Some have even suggested that infantile play is merely the "overflow" of nervous energy along these channels. A bit later, play takes the form of fancy, impersonalization, and the dramatization of meager events and objects, and there is little distinction between work and play.

Somewhat later play takes the form of miniature duplication of adult activities and of events read of in stories. It is this stage that has suggested to some the idea of play as a rehearsal of and preparation for adult activities.

Later, plays become group activities, in which there is a tendency to offset individual strivings by more or less definite restraints which serve to guarantee to each a share in the enterprise, and group competitive activity, with its socializing effect, enters.

Still later the organized teams, no longer all-star groups, but with mutual subordination to the rules of the game and to the interests of the team, the cause, the institution, appear. Restraints and controls of individuals and their initiative are here conspicuous. In adolescence plays are likely to take the form of the sanctioned removal of customary restraints; kissing games, the postures and tentative intimacies of the dance, displays of prowess, of grace and beauty, and other forms of exhibitionism that are in daily life somewhat tabooed, are now by tacit consent indulged.

By the time of maturity this aspect of play, as the temporary release from customary inhibitions and constraints is very marked. In the interest in the drama and the novel we see exemplified the desire to escape from the inhibitions of reality and to move in a freer, if unreal, world. The adult enjoyment of bathing and swimming is perhaps in large measure due to the fact that the human body, in the water, may relax the usual postural adjustments. It need no longer, in the interests of safety, preserve a fixed equilibrium and maintain its center of gravity precisely above its base of support. There are also the releases from clothing and various social constraints associated with the swimming pool.

In the institution of marriage, although this is not usually classified as a play activity, we nevertheless find a device for temporarily and legitimately removing the pre-

vious constraints of impulses and drives which have as their climax the reproductive acts. Perhaps the widespread addiction to drugs, especially alcohol, represents again only an endeavor to find release from ordinary constraints, inhibitions, and taboos. The coward, when intoxicated, marches boldly, joyously singing, into danger. The timid, modest individual, with restraints removed by alcohol, becomes eloquent, conducts his conversation, his wooing, his fighting, with fewer constraints and inhibitions.

Even war may be looked upon, in many of its aspects, as merely a welcome opportunity for relaxation from the enforced suppression of many of those impulses which we ordinarily recognize as bestial or brutal, in times of peace. In general, the plays of adults tend to take the form of licensed sins, and it seems that in this relaxation from the restraints of ordinary duty, in the removal of impediments to dispositions and tendencies long thwarted, they derive a satisfaction that few other modes of conduct can provide. At least this statement is true enough to throw a good deal of light on the play activities of adults, and on the nature of various social practises. It is possible to go even further. Many psychiatrists are inclined to look upon some of the psychoses of adult life as constituting a form of flight from reality. On this conception, the psychosis becomes a mode of play, serving the purpose of temporary escape from the responsibilities of normal adult endeavor.

With this rough survey of adult play we must bring to close our survey of the mental features of maturity. Confessedly and obviously our account has been sketchy and dogmatic, and it has not even touched upon many of the

most interesting of adult activities. Since this period of development extends over more than half of the period of human life, it in many ways merits more detailed consideration than we can give it in the brief compass of a chapter of this book. The usual textbooks of psychology concern themselves almost exclusively with the psychology of "the normal adult." To such volumes the reader must go for more elaborate portrayals of the mental life and development of maturity. Volumes on "abnormal psychology," in turn, will portray the more marked modes of deviation and individual maladjustment.

CHAPTER XIV

SENILITY—THE PERIOD OF DECLINE

THE GENERAL PICTURE

The two greatest tragedies of human life are sleep and death. The first steals one-third of the time we have to live; the other abruptly terminates it. We spend a lifetime learning and acquiring wisdom; we are not long spared to exercise what we have learned. Sooner or later even the longest-lived begin to move downward or backward on the growth curve, through senescence to senility. With many life ends abruptly, without the appearance of obvious decline. With others a period of gradual disintegration precedes the end. Some features begin their decline relatively early, as in the case of memory, curiosity, and enthusiasm. Others defer their involution to the later days. Nor can age limits be assigned this period, for individual differences are great.

Shaw, in his "Back to Methuselah," proposes that man's life is too short for him to acquire competence to carry on the complex civilization he has devised. He portrays an imaginative picture of a future world in which infants make in a minute the growth which now takes them years; they are born full size and physically mature. Life then speeds rapidly, and the average span is hundreds of years instead of the traditional threescore and ten. The work of our present world constitutes the pastime and

toys of infancy in that fantasied world. The children manufacture such effigies as we are, and play with them as dolls. The "ancients" are profound and wise folk with power to make things happen through willing them. Such a world, he suggests, might sometime occur.

Shaw's conception is not entirely fantastic. Studies of "bright children" show that their development is hastened all along the line. Not only are their mental capacities developmentally advanced, but so also are their physical traits. In size and weight these bright children excel the average child, and they persist in this excellence. Puberty arrives rather earlier than in the average case, and changes of physique are advanced, though not so far as are the mental characteristics. It is thus entirely possible that if society should in some way make this type of variation favorable for survival and reproduction, the life span could be lengthened and the period of infancy materially reduced.

Senility and earlier senescence are important in the life plan of men, because abruptness of retirement commonly complicates the mental picture and increases suddenly the feeling of inadequacy. In the case of women, recent reports suggest that senility tends to be prolonged at both ends of the period. Some university executives have recently intimated that such an institution "should look forward to retiring its women teachers at an earlier age than its men teachers." On the other hand, annuity associations sometimes charge higher rates in the case of women on the ground that their expectation of life is longer than that of men. And many women lose their chief occupation, that of childbearing and care, earlier than the conventional age for male retirement. On the

other hand the less routine nature of the typical or traditional "woman's work" makes it easier for her to make the shift to idleness than it is for the scheduled business man, for whom the changes are likely to be more abrupt.

PHYSICAL CHANGES IN OLD AGE

The physical picture of old age is familiar.[1] It may be in general summed up in the following sketch. There is general wasting of musculature and disappearance of subcutaneous fat. These lead to impairment of motor activities and to the appearance of wrinkles and changes of facial expression. The hair grays and vascular markings appear over the skin surface. Heart, digestive system, liver, and other internal organs function imperfectly. There is a general reduction of glandular activity. Tremor and unsteadiness appear, and consequent difficulties of coördination. The accommodatory organs of the special senses lose their elasticity. In vision there may be difficulties of refraction and clouding. Pupils become irregular in appearance.

The brain decreases in weight; during the years from thirty-five to sixty-five brain weight decreases on the average by nearly 100 grams. In advanced cases of senility there is a smoothing out of the cerebral convolutions, a deepening and broadening of the brain fissures. The interior brain cavities expand and the amount of spinal fluid increases. Gross changes in the nerve cells are also found, pigmentation and granular degeneration. Supporting tissue and neuroglia fibers increase in amount.

The general responsiveness and vigor of the organic

[1] Hall, *Senescence*, 1922.

system parallel the decline of muscular vigor, and the organic basis of emotional responses is dulled and retarded. Glandular structures deteriorate and often cease to function. Especially marked is the decline of the reproductive system and the loss of reproductive potency.

The general physical picture is thus one of dependence and relative helplessness, associated with a restriction of the range of activity, a limitation of voluntary enterprise. Economic and occupational inadequacy arise; there is a loss of emotional responsiveness and zest, and a general inability to keep up with the demand of life. The picture is often rendered more acute by actual economic dependence. Insurance statistics show that not over 4 per cent of adults, at old age, have accumulated a competence sufficient to keep them independent of the charity of relatives or of public philanthropy.

SENSORY CHANGES

Marked changes occur in the field of sensation, and consequently in general understanding and ease of adaptation. Characteristic of the changes due to growth is the loss of taste buds, especially along the inner cheeks and sides of the mouth. In early childhood the taste buds are distributed over the whole surface of tongue and inner cheek. With increasing age, the sensitive area diminishes in size. The top of the tongue, just back of the tip, becomes an area of insensitivity. Likewise with adult life and old age, the inner cheek walls lose their sensitivity, the tip of the tongue becomes less sensitive, and the insensitive area of the top surface increases in extent. Only sides and back of the tongue remain sensitive, and

even here the fineness of sensitivity is decreased with old age.

As early as the thirtieth year the ear becomes less sensitive. Especially noticeable is the increasing inability to hear sounds of high pitch. Not only is the range of audible pitches thus shortened, but there is a general dulling of auditory sensitivity, and in many cases notable deafness or difficulty in hearing ordinary sounds such as speech and music.

The capacity of the eye likewise diminishes. This is especially due to the process of accommodation, which diminishes in flexibility and range. The lens of the eye is allowed to bulge out, in looking at near objects, through a contraction of the ciliary muscle which pulls forward the choroid coat, thus allowing the lens to bulge by virtue of its own elasticity. With age this elasticity is lost and even if the ciliary muscle continues to function, the responses of the lens are inadequate for near vision. The aged thus naturally become "far-sighted," and this condition is sometimes called presbyopia, because of its association with old age. Lack of control of the tear-gland outlets also occurs, as a result of which excessive moisture in the eyes disturbs accurate fixation and helps to cloud vision and interfere with visual pursuits.

Simple experiments disclose the extent to which tactual sensitivity depends on the softness, moistness, and flexibility of the skin. With the general drying, wrinkling, and toughening of the skin, which accompanies old age as one of its striking characteristics, the delicacy of touch is also impaired.

In general then the changes in sensation are all in the direction of incapacitating the individual from his wonted

activities. He thus tends more and more to be excluded from the world of action, and is thus naturally encouraged to retreat to an inner world of memory, fancy, and self-absorption. These effects are in line with the effects of many other changes.

CHANGES IN MENTAL CAPACITY

Very few experimental data or measures are available on the mental changes after the period of early maturity. For one thing, it has been difficult to assemble unselected cases of middle age or senescence, for such examinations as experiments of this type require. The writer once had occasion to examine 534 adults, ranging in age from below twenty years to forty-five years. In the following table the scores for these men are given in age groups, there being thus about 100 men in each age level.

TABLE XX

CHANGES WITH AGE, AFTER MATURITY (Hollingworth)

Age Level	Completion	Naming Opposites	Word Building	Digit Span	Substitution
Below 20 years...	31	12	10	6.0	68
20 to 25 years...	32	12	10	5.5	64
25 to 30 years...	32	11	9	6.0	60
30 to 35 years...	32	12	10	6.0	58
35 to 45 years...	34	12	12	6.0	57

The scores in Digit Span, Word Building, Naming Opposites, and Completion, do not change with age. But ability in the Substitution test falls off regularly with increasing age. The fall from a score of sixty-eight at age twenty to fifty-seven at forty years or thereabouts, is very significant. This is a loss of eleven points, and is

equivalent, in terms of mental age, to a fall from an age of sixteen to that of eleven years, from a postadolescent to a preadolescent ability.

The Substitution test is the only one of these that calls for the establishment and exercise of new associations. The remaining tests involve essentially the quick and ready use of bonds already established, or the ordinary mental efforts of attention and intelligent observation. And these records go only up to the age of forty-five years, before the changes commonly associated with senescence appear. The results seem to confirm the statement of Paton that "generally speaking, the acquisition of new facts and intellectual expansion in the individual do not continue after the fiftieth year." At least our results suggest that such acquisitions will proceed with greater difficulty. We may suppose that actual changes in brain organization underlie this specific loss in capacity for ready learning. In general the fact seems to be that with increasing age, after maturity, learning capacity declines while general alertness and ability to utilize facts already acquired are still at their maximum.

It is however to be recognized that adults, and especially the aged, are little called upon to make new adjustments, or are temperamentally indisposed to do so. For one thing, the learning of new things commonly implies a forward-looking interest which is less characteristic of age than of youth. Again, the established habits and accumulated knowledge which have sufficed to bring the individual thus far may commonly be trusted to serve as well in such future contingencies as may arise. For this reason the experimental results which show less ready learning in the aged may in part come from their having

somewhat abandoned the learning attitude. Perhaps these results show, not that the old cannot learn so easily as formerly, but merely that they do not. Capacity and performance are surely distinguishable, although the experiments have not, up to the present, been able to take this distinction into account.

We need a much greater accumulation of actual experimental studies of the learning capacity of adults and the aged. Even if these tentative results point to the actual limitations of the establishment of new associations in age, they do not yet prove that learning capacity ever completely ceases in the average case. The exact determination of the rate of mental changes in age is a matter for future research. Experiments with lower animals (rats) have shown that younger ones (under two months of age) are able to learn the problem of finding their way through an experimental maze in about two-thirds the number of trials required by older ones (ten months in age). And when the maze was finally learned, the younger ones were accustomed to traverse it in about half the time required by the older ones. Such results in the case of the learning of the aged accord with the other general fact, that memory is among the first of the mental dexterities to fail.[2]

Adequate investigations of the status of higher forms of mental activity as a function of age have not been

[2] One of my former students, in 1924, measured a small group of old people ranging from sixty-three to eighty-three years of age. "The old group equals the army men on Knox Cube Test and Memory Span for digits. There is a decline on the Porteous Maze Test, a very marked decline on the Substitution Test and complete failure on the Paired Associates Test." (From Helen Werner, unpublished master's essay, Department of Psychology, Columbia University, 1924.)

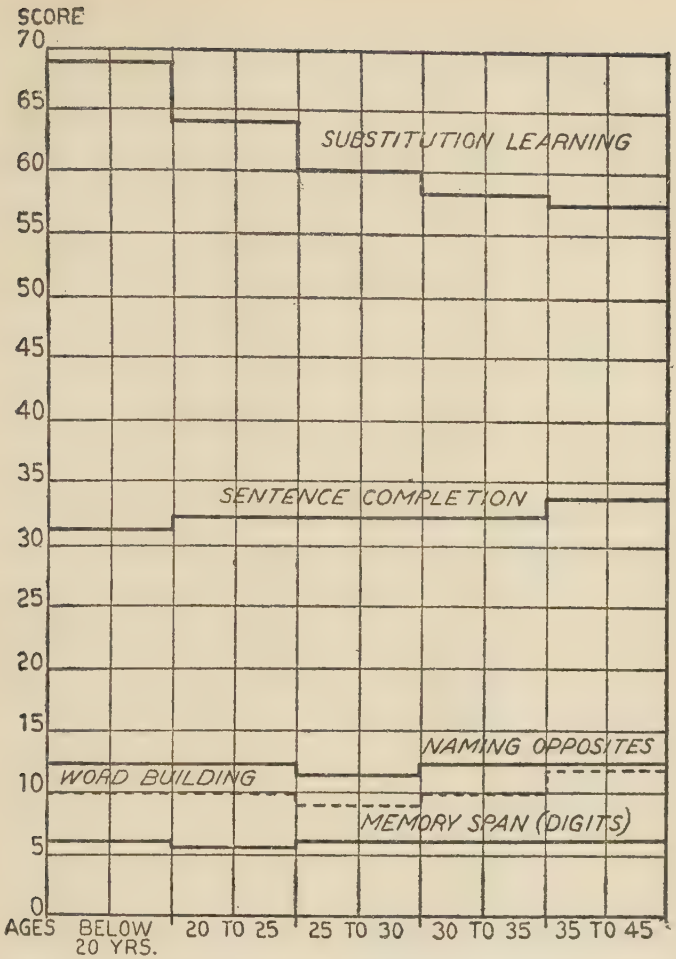

FIG. 20.—SHOWING CHANGES IN ABILITY TO DO VARIOUS KINDS OF MENTAL WORK, WITH INCREASING AGE.

The higher the score, the greater the efficiency. Ability in Substitution Learning declines with age, while the other processes remain unchanged, or else slightly improve. (From Hollingworth.)

conducted. Such results might easily be complicated, for one thing, by sensory impairment and motor incoördination, which would be quite different matters. The study of such changes as may come, after maturity, in the processes of judgment, sagacity, inference, problem solution, determination, and the like, remains yet to be undertaken.

PROGRESSIVE AMNESIA

The general tendency to deterioration of the brain has also another result, namely, the gradual loss of those associative bonds already established. Associative memory weakens, and declines in an involutional fashion, following the lines of least organization. The more recent impressions and experiences are the first to be lost; later, those of adult life; then those of youth; and finally, those of early childhood. "It is not uncommon," says Rosanoff, "to meet with advanced senile dements who, though incapable of recollecting the existence of their wife and children, are still able to relate with minute details the occurrences of their childhood." General principles are better retained than are specific events and concrete experiences. "Common nouns are remembered after proper names are forgotten; verbs are remembered longer than nouns; and gestures persist when words have been forgotten."

In addition to the disabling consequences of this tendency, there are other important results. The senile individual is thrust back into his past, and more and more excluded from the world of the present. His thoughts dwell, if at all, on earlier experiences, and earlier values, habits, and ideas come to play the dominant rôle. Even

personal loyalties may shift from present associates to those of earlier affiliation. Interest in current affairs diminishes. The aged or senile revert to "the good old days," which, through the "obliviscence of the disagreeable," seem better, richer, and more real than the present. Age is thus "conservative, reactionary," and resistant to the newer ways of the younger generation.

These tendencies are reinforced by the inability of the aged to take an active part in current enterprise, because of their physical handicaps. They may be compelled to resign from their work, or may be deliberately dismissed, so that in the common case even the individual's own living does not depend on his present activities. The old soldier's reminiscences of the war seem to him more real and important than do the current national calamities. In so far as he is still in power he tends to foist upon the changing generation the older standards of conduct, the old ideals and institutions.

This conflict of old and young has led to various types of adaptation in primitive life. On the one hand the elders are in possession of the stores of knowledge, especially before the days of printing. They know the ways of success and the sources of magic. For this reason there is a tendency to respect them, a tendency which is increased in so far as the aged also hold property, reputation, and other forms of prestige. On the other hand the aged become a definite burden and impediment; their conservative ways thwart change and progress. For such reasons there is a different reaction, so that some tribes even go so far as to kill the aged when they reach a sufficient stage of decrepitude. In our own days these extremes are not realized, but there is still the conflict of the aged and the

young, between the progressive amnesic, looking backward, and the adolescent, looking forward. The "pointing" of developmental stages, which we have elsewhere referred to, is clearly in evidence in this comparison.

William James,[3] in a letter written in his sixty-sixth year, writes that the grand spectacle of daybreak "doesn't appeal to my sense of life, or challenge my spirits as formerly. It suggests no more enterprises to the decrepitude of age, which vegetates along, drawing interest merely on the investment of its earlier enterprise." In another letter, referring to previous walking expeditions, he writes:

> Past and future play such a part in the way one feels the present. To these youngsters, as to me long ago, and to you today, the rapture of the connection with these hills is partly made of the sense of future power over them and their like. That being removed from me, I can only mix memories of past power over them with the present. But I have always observed a curious fading in what Tennyson calls the "passion" of the past. Memories awaken little or no sentiment when they are too old. . . .

SENILE EMOTIONALITY

The emotional characteristics of old age are well known, in a general way, although individual old folks show surprising differences in emotional outlook. The old man is often called irritable, cantankerous, hard, inflexible, unresponsive, apathetic, unenthusiastic. He shows fewer signs of pleasure, weaker signs of love, and perhaps also milder hates and weaker fears. What is the basis of this predisposition toward unpleasantness, depression, and discouragement?

[3] *Letters of James*, II, pp. 317, 222. (Quoted by the permission of the Atlantic Monthly Press.)

Emotional reactions depend in part on the vigor and activity of the autonomic system, the vasomotor system, and the glandular processes, on the general organic mass of sensation. Characteristic of old age is the growing inertness of these systems. The hardening arteries no longer pulsate with their former liveliness; the heart and diaphragm, the glands of internal secretion, the reproductive system, changes of muscular tonus, are slower in their reactions, more habituated, and less vigorous. In the absence of these autonomic and organic constituents the very core of emotional experience is enfeebled. Especially the active emotions, those of interest, enthusiasm, pleasure, are reduced, and affective life tends toward a level of apathy.

On the other hand, certain of the resistant emotions may now show themselves with unaccustomed intensity. The crotchitiness, the irritability, the intractableness, the querulousness, are conspicuous. We must remember that affective tone depends in part also on the facilitating or thwarting effects of experience. In old age there is a clear preponderance of thwartings; the old man would climb the stairs, would continue his business, would keep up with the activities and plays of the young, but he cannot. Spirit and flesh may be at odds. Life resolves itself into a continued discovery of new limitations. This is the basis for much of the unpleasantness of mood and disposition which therefore vary widely also with the individual's economic circumstances.

Again, the feeling tone of the organism depends in part on the excess of repair over destruction. It is in part the superabundance of energy that constitutes the basis of the pleasure reactions and the play impulse. Notoriously,

it is just in old age that the process is reversed; decay overruns repair in all the bodily systems.

Strangely enough, some experimental results show that the verbal association reactions of the aged display an increased emotionality. Free associates to a series of stimulus words are more likely to be emotionally toned, rather than to represent purely intellectual relations. This exaggeration of emotionality has been interpreted, by Jung, for example, as being an artificial effort at compensation for the felt emotional lack. Just as the tottering senile man may assume a false aspect of sprightliness, the old lady a false appearance of conversational alertness, to cover painful feelings of inadequacy, so these association reactions suggest a degree of emotion which they do not really indicate. The exaggerated affection and profuse caresses of old aunties and grandmothers may have this as part of their motivation.

An important aspect of the emotional reactions of the aged is that they bear directly on personal relations, rather than on things in general. Emotions are self-centered in age, and this introduces us to another senile characteristic, the inclination toward self-reference.

THE SENILE SELF

At adolescence, as we have seen, there is an expansion of self-awareness. New organic sensations, new opportunities, new experiences and acquaintances, new emotions, impulses, and responsibilities, adult garments and prerogatives, give a push to self-consciousness which is one of the strongest features of the adolescent period. Curiously enough, a change of just the reverse character

comes with senility, the effect, however, being again an exaggeration of self-reference. In this case it is the loss of familiar sensational components, the failure of customary impulses, the weakening of emotions, the lowering of responsibility, and the limitations of the environment, that are at work. The senile are threatened with a loss of the self; there is a gradual reduction of the scope of experience designated by the self-idea.

Apparently in an endeavor to hold fast to these disappearing components, self-feeling is enhanced and exaggerated. The aged become notoriously selfish, by which we mean that the self, as an object of thought and reference, becomes more conspicuous. Approaching disorders call attention to the body and its ills. The senile become characteristically hypochondriac, dwelling on symptoms, worrying over insufficiencies. So preoccupied may they become with their own difficulties that they may lose interest in other members of the family. Seating arrangements about the fireplace must be made with them in mind; they must have their particular chairs; ventilation and illumination, and the loudness of talk must be changed to suit their peculiar demands; food tastes are finicky. The garrulity of the aged is only another symptom of this increased preoccupation with personal interests and values.

Self-depreciation becomes difficult. Feuds and long-standing quarrels that the young may desire to abolish or to terminate, are cherished by the aged. Techniques, customs, games, modes of transportation, industrial systems, methods of bookkeeping, in all such fields there is the tenacious attempt on the part of the old to perpetuate those modes that have become identified with self.

Very often there develops, on the basis of this hypochondriacal self-reference, a more or less opposed set of ideas of culpability and self-accusation. Memories of the past predominate, and past sins are dwelt upon. Rumination over the past, with the average individual, is not a very flattering procedure. The aged thus incline toward religious atonements, increase their philanthropic contributions, become more faithful devotees of the church, and may mourn their past sins. In extreme cases this may result in deep depression, ideas of persecution and guilt, efforts at self-destruction, or the development of delusional systems more or less calculated to rationalize and explain the changing experiences and self.

Various changes in nervous system and sense organs, vasomotor changes, and the like, often give rise to hallucinatory experiences. These add themselves to the general background of maladjustment and hypochondria. Insane ideas and suspicion may arise; paranoid formations may develop. In marked cases, dementia of a profound and progressive sort may set in, giving the clinical picture of involutional melancholia or of senile dementia.

MENTAL HYGIENE OF OLD AGE

Just as there is an appropriate mental hygiene of childhood and of adolescence, so there is a mental hygiene for senility. At adolescence it is often the suddenness of educational, economic, and domestic changes that serves to unbalance the individual, and act as the provoking cause of maladjustment. The hygiene is that of gradual preparation and adaptation, understanding, and knowledge, as distinguished from abruptness, ignorance, taboo, and su-

perstition. So also with the approach of old age, the bodily changes cannot be prevented, although perhaps by a hygienic life during maturity they may be moderated and postponed. But inevitably the change must come. The appropriate hygiene, again, is that of foresight, gradual adaptation, and understanding.

Many cases of senile dementia and involutional melancholia seem to be directly provoked or introduced by too abrupt changes in the personal fortunes and mode of life. Thus one typical case was predisposed to manic-depressive episodes, but his vigorous activities, family cares, responsibilities, and occupational continuation kept him above board except at two short periods of his life. But suddenly several things happened; the children, who had all been living at home, married within a short time; his wife died. His loss of immediate interests and his incapacity for his trade, by virtue of an accident to his arm, definitely put him in the aged class. He had failed to develop incidental and avocational interests, and had not cultivated intellectual interests that he at one time had. He had moreover so estranged himself from his children and other relatives that he was suddenly alone in the world. Within a year there ensued the characteristic picture of involutional melancholia and death, through the complication of heredity and environment.

In general, the way to grow old gracefully is to begin to do so at an early age. This amounts to the same thing as trying to remain young for a longer time. There is no reason to believe that a definite effort to become more adaptable, to increase one's range of interests, to provide activities which may be assumed when definite economic service terminates, and to forestall the thwartings of senil-

ity, may not result in increased happiness and prolonged comfort in age.

Old age is often called the period of second childhood. We have seen, in the loss of learning capacity, the reduction of brain power, the loss of elements of the self, the withdrawal of activity from the social setting, the dependence, the loss of emotional bases acquired at adolescence, the progressive amnesia, the pettiness and selfishness, and even the shrinking in size and the enfeeblement of motor processes, the reasons for this figurative description. From a practical point of view the senile do come to resemble children. But senility is no more a genuine reduction to childhood than is maturity the mere expansion of infantile proportions. Old age has its own psychology, just as does every other age. Just as we should not expect to make adults of children, so we should not hope to make angels of the aged. The best plan is that of seeking to understand them for what they are, and in this effort developmental psychology should render great assistance.

THE UTILIZATION OF GRANDPARENTS

While it is not the place of the psychologist to prescribe the activity of groups of people, it may nevertheless be his privilege to suggest possible ways of promoting mental hygiene and encouraging human happiness. With respect to the aged there is at least one specific suggestion that seems not without merit.

In recent years there has been a marked reduction in the birth rate, since, in part, the presence of infants entails such a burden on adults, calls for particular sacrifice on the part of the mother, and yet involves neither social

nor economic recompense. Many solutions of this problem have been proposed: mothers' pensions, which give a certain economic recognition of maternity; prohibition of information concerning methods of birth control; stimulation of feelings of social duty and patriotic service; emphasis, in art and literature, of the beauties of maternity and parenthood; taxation of the childless; increased stipends for married workers with children, and the like. Our solution is far simpler, at least in description.

On the one hand society is burdened by the prolongation of infancy and education. On the other it faces an increase in the average life span and in the number of the aged. The infants need some one to care for them; the aged need something for which to care. Grandparents are full of wisdom and experience; they need occupation and new interests; they require an environment that will not thwart their every impulse. And it is likely to be the aged who are most insistent that the race be prolifically perpetuated.

At present the practice, based solely on folkway and traditional usage, is to let the parents bear the burden of infant care, while grandparents sit inactively by, criticising the ineptitude of the parents. Would not many aged men or women, upon retirement, be eased more gracefully toward the end by the assumption of a new obligation to which they could bring the ripeness of their experience, their skill, and family pride? Could not social organization profit from the skipping of a generation in the program of infant care? If children were, by general expectation, the estate of their grandparents rather than the property of their fathers and mothers, the active generation of adults would be released from its chief handicap,

and the two chief problem-ages (infancy and dotage) provided with care and motivation compatible with their dignity.

> . . . The keepers of the house shall tremble,
> The strong men shall bow themselves, and
> The grinders cease, because they are few,
> And those that look out of the windows be darkened.
> The doors shall be shut in the streets,
> When the sound of the grinding is low;
> He shall rise up at the sound of the bird,
> And all the daughters of music shall be brought low.
> Fears shall be in the way . . . and desire shall fail,
> Because man goeth to his long home,
> And the mourners go about the streets.
> Or ever the silver cord be loosed,
> Or the golden bowl be broken, or the pitcher
> Be broken at the fountain, or the wheel at the cistern;
> Then shall the dust return to the earth as it was;
> And the spirit shall return unto God who gave it.
>
> ECCLESIASTES, 12: 3-7

GRAPHIC REPRESENTATION OF DEVELOPMENT

If we try to represent the course of human life by a curve of growth or a curve of development, we find at once that no single curve is adequate to portray the actual complexity of the individual's history. Different features begin to appear at different times; mature at different rates; begin to decline, if decline they do, at different times, and proceed here also at different rates. Features beginning early may reach maturity later than features starting later. Features declining early but slowly may outlast those which decline later but more rapidly. A very complex set of curves would result if we had actual

measurements of the way in which each feature develops. As a matter of fact, we have only the beginning of such measurements, in the case of a few traits. What we have enables us nevertheless to construct a set of hypothetical curves which, while they do not begin to represent the actual complexity, nevertheless indicate the reason for that complexity, and something of its nature. The following set of curves is proposed as a convenient graphic representation. It might indeed serve as a suggestive text for a long disquisition on human development.

In this diagram the individual's life history is represented as the base line, beginning at A, the moment of conception, and extending definitely onward. Point B is the date of birth. After that the vertical lines and the base line points indicate years of life. Before the fifth year the stretches of time are somewhat magnified on the diagram, in order to permit such representations as must be made in these early short but significant periods. On the vertical scale are represented, in terms of per cent, the different conceivable degrees of maturity, this scale of course applying to the maturity of each feature, rather than to that period life which we call by the name.

The rising curves, representing features in the process of maturing, are represented or indicated by numbers. Nine are shown. The process of development toward decline is shown by the curves assigned letters toward the end of the alphabet. The period before point A, the moment of conception, represents the ancestral history, the two heredities involved in sexual reproduction being roughly represented as Hs (heredity, sperm) and Ho (heredity, ovum). The line of maturity, running across the chart

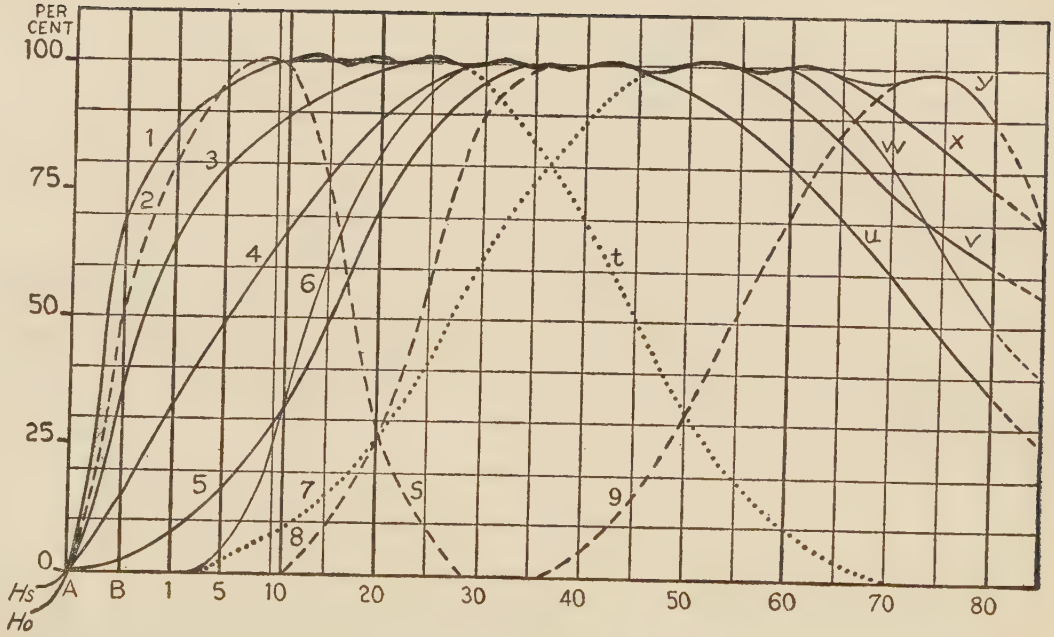

FIG. 21.—THE LIFE SPAN OF THE INDIVIDUAL.

on the 100 per cent level, is wavelike, suggesting that even at maturity there are fluctuations about an average status of functional adequacy or stability.

The curves thus represent at least some of the complexities of actual development. During the fœtal period (A to B) different features develop at different rates, so that by the time of birth some are nearer their own maturity than are others. Curve 1 or Curve 3 represent features maturing in a convex curve, increasing rapidly at first, then more slowly, in terms of relative amount. Increase in height would represent such a trait, as would also the curve for immediate memory and memory span, and perhaps the curve for general intelligence. Curve 4 represents a feature that grows steadily and uniformly, such as perhaps the size of vocabulary. Curves 5 and 6 represent feature developing by concave courses, such as height and muscular strength.

Curve 2 combined with the downward Curve S represents such features as may arise early, early mature, and quickly decline, as perhaps the activity and size of the thymus gland, the grasping reflex, and the like. Such features, as the curves suggest, may arise and disappear before other features, such as those represented by Curve 9 appear. Curve 9 might represent the development of an insane delusion, of a senile tremor, of an interest in politics, arising slowly and late in life. Curves 7 and 8 also represent features arising relatively late, as perhaps interest in team plays, reproductive activity, and vocational ambitions.

The downward curves also suggest differential times and rates of decline. Curve U might represent such learning capacity as is measured by substitution tests; Curves V and W such changes as the senile losses of memory or of

sensory acuity. Curves X and Y represent processes declining still later in life. The tailing off of these curves, as shown by the dotted lines, may be taken to represent the post-mortem persistence in the form of influence in the activities of coming generations.

This set of curves, representing the developmental life span of the individual human being, is not intended to be fantastic, although it is easy to find bizarre aspects in the diagram. The graph is designed chiefly to portray in graphic terms the extreme complexity of development, as we have sketched it in the foregoing chapters. It might easily be elaborated so as to constitute an actual graphic summary of developmental psychology, and the time is rapidly approaching when it will no longer be necessary to confess to the hypothetical nature of such curves and to apologize for their inaccuracies. When that time arrives, numerous features of human personality will have been so carefully measured and traced that actual representations of growth may be given, and the curves be given the names of actual processes, features, acts, or skills, rather than abstract letters and numbers.

CHAPTER XV

ABNORMAL MENTAL DEVELOPMENT

THE NATURE OF ABNORMALITY

In a psychological sense, development may be abnormal in either of two principal ways. Development that is abnormal deviates from some norm or standard. The norm may be either the most common or frequent condition of human beings, the statistical norm; or it may be the usual condition of some person, an individual norm. Abnormality need not, in either of these senses, be unhealthy or unfavorable. Talent is abnormal, in that it is infrequent. An intelligence quotient of 150 is a conspicuous deviation from the norm, it is supernormal. An oration, or other feat, may be abnormal in its superiority to the ordinary accomplishment of its author.

More attention has been given, however, to subnormality, to deviations below the average status of the group or of the individual. This has been because supernormality commonly carries its own burdens. Subnormality, on the other hand, inflicts burdens upon others. Burden bearing readily stimulates an attitude of inquiry in those capable of that enterprise. Therefore, until very recently, genius was left to shift for itself. Incompetence was carefully investigated. Consequently our knowledge of inferior development is considerable and systematic. Our information concerning the genetic aspect of genius is

fragmentary and patchy. Even the recent interest in gifted children must await full interpretation until these individuals, in maturity, have fulfilled the promise that is in them. Our discussion of abnormality must therefore be directed chiefly to the various forms of mental ailment.

MENTAL DEFICIENCY[1] AND SENILE DEMENTIA

We have already considered two obvious forms of subnormality. In mental deficiency (amentia) we have seen the consequences of development which begins at a low point, proceeds with a less than average pace, and attains a subaverage status at maturity. Such conditions are represented by the idiocy, imbecility, and moronity of Chapters IX, X, and XI. The characteristic mental profile of intellectual deficiency we have portrayed in Chapter VI. It needs only to be pointed out that this type of deficiency may be of any degree. The three levels of backwardness which we have indicated are arbitrary and conventional. The line of the mental profile may proceed at any angle from the normal base line (see page 84), and various irregularities and more or less specialized deficiencies may also occur. In about 90 per cent of the cases, amentia is primary, due to defective germ plasm. In a few cases, the secondary forms, it is incurred during early life as the result of organic disease or injury.

Mental measurements of large numbers of people reveal intellectual ability to be distributed as represented in the accompanying graph. The base line gives intelligence quotients and the area of the enclosed surface above each

[1] Collateral reference: L. S. Hollingworth, *Psychology of Subnormal Children.*

section shows the proportion (per cent) of the population at large exhibiting the various degrees of capacity. Two per cent, approximately, fall below an intelligence quotient of seventy. These are by common consent called feeble-minded. If the middle 50 per cent, lying between 90 and 110 I. Q., be considered the "normal group," it is seen that nearly a quarter (23 per cent) of the population lie be-

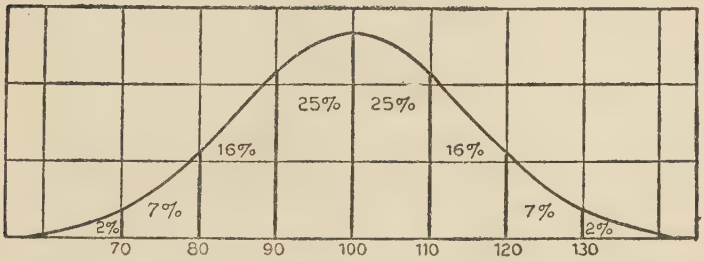

FIG. 22.—DISTRIBUTION OF INTELLIGENCE IN THE GENERAL POPULATION.

Along the base line are indicated the various degrees of measured intelligence, in terms of the intelligence quotient. The vertical lines and areas show the proportion of individuals lying above the various regions of the intelligence scale.

tween feeble-mindedness and normality. These represent varying degrees of dullness and stupidity. Even the average or normal man, as we have seen in Chapter XIII, is an individual capable of only modest intellectual feats.

Mental deficiency is subnormal ability to grow. Senile dementia is inability to maintain the growth status already achieved; the individual departs from his own previous norm. Integrations once accomplished are weakened; facts once learned are forgotten; forms once elaborated now deteriorate. The extreme features of senility have already indicated with sufficient clearness the lines along

which mental disintegration proceeds. Both in mental deficiency and in senile dementia the picture rests chiefly on faulty organic structures. Limitations of the whole system, but especially of brain and nervous system, underlie these abnormalities. Dementia, in the sense of deterioration and dilapidation of personality, may occur also in other conditions, such as epilepsy, chronic alcoholism, dementia præcox, and general paralysis of the insane (paresis).

FUNCTIONAL MENTAL DISORDERS [2]

Many faulty developments of conduct, thought, and feeling cannot be ascribed to any discoverable structural basis. They are attributed to faulty modes of action, chronic maladjustments, disordered habits, and other functional features. Some of these conditions are constituted by only one or two "symptoms" or "complaints." In others there is an unfortunate proneness toward the manifestation of such symptoms. In still others the complaints multiply, become systematized and chronic, and may assume conventional or typical patterns which comprise the "clinical entities" of psychiatry.

Functional conditions are likely to be characterized by frequent intermission of symptoms; by their variability in character and intensity; their amenability to the devices of psychotherapy (persuasion, suggestion, explanation, motivation); by their lack of relation to the well-known anatomical distribution of nerves; and by their unassignability to specific injuries of the nervous system or to recognizable structural defects in other bodily systems.

[2] Collateral references: H. L. Hollingworth, *Psychology of Functional Neuroses;* McDougall, *Outline of Abnormal Psychology.*

The following typical conditions may be indicated, as illustrating the way in which such developments occur through psychological modes of origin.

CONDITIONS CAUSED BY OR CONSTITUTING EMOTIONAL STRESS [3]

In prolonged fear, worry, excitement, anxiety, rage, and conflict, profound visceral changes are involved. The heart, the vasomotor system, and especially the glandular systems, are thrown into unwonted forms of activity. The consequences of these activities may not quickly disappear. The condition may outlast the situation which provoked it. The autonomic system forms habits; glandular excess or imbalance, established in emergency, may persist; chronic emotional disturbance may result. Stage fright is a mild example. More marked are the conditions observed during or after earthquake, wreck, or battle. Prolonged anxiety or sorrow may induce chronic inability to eat or to digest (mental anorexia), just as temporary excitement may dispel momentary appetite. Stuttering is intensified or aggravated by excitement or embarrassment. Epileptic predispositions, not hitherto manifested, may be provoked by stress or excitement. Such conditions may have a long developmental history, reaching far back into early life, resting on hereditary inadequacy or feeble resistance, complicated by the constellation of immediate "provoking causes."

HABIT RESIDUALS

These may be either primarily of organic origin or secondary and accessory. Habits of digestion, excretion, pos-

[3] Collateral reference: Cannon, *Bodily Changes in Pain, Hunger, Fear and Rage.*

ture, gait, sleep, originally caused by organic disability, may become chronic. Thus persisting after their structural occasion, they become functional complaints. Tics, grimaces, and motor automatisms may thus originate, and become difficult of correction. Urinal incontinence (enuresis) may thus depend on a threshold of release habitually lowered.

The limp, resorted to in order to protect a recently healed bone, may long endure. Drug habits may follow as residuals from the earlier medicinal use of habit-forming prescriptions. Ceasing to "listen," because of temporary deafness of organic origin, may persist in the form of functional deafness. Persistent hypersensitivity to noises may follow conditions in which sounds were excusably painful. Prolonged "ceasing to listen," "to look," or "to intend to walk" may often follow organic incapacity. Children who have previously walked or talked may have to "relearn" upon recovery from a confining illness. Soldiers in foreign prison camps, hearing only strange speech, first fail to understand, then cease to listen, then no longer hear the human chatter about them. Upon release deafness has been observed, which is curable by teaching the patient not so much "how to hear" as "how to listen."

SYMPTOMS RENDERED VIVID BY SUGGESTED ATTENTION

When one is examined by the physician, who inquires, "Do your eyes burn?" "Does your back ache?" "Is your thumb stiff?" it is astonishing to find how many bodily sensations have hitherto escaped attention and now stand out. Fixation upon them increases their intensity and vividness, which is the characteristic effect of attention

everywhere. In epidemics of influenza, flat feet, trench back, and malaria almost every one becomes hypochondriacal and full of previously unobserved sensations. Fear of a disease fixes attention on the parts of the body involved in it, and the fear is heightened by sensations readily observable there at any time, but ordinarily ignored. The pains which often persist years after a surgical operation may be in many instances not due to physical "adhesions," but to mental ones. The functional character of such symptoms is revealed when they yield to explanation, to incentive, to motivation, to new interests, or to any procedure that effectively distracts attention away from them.

CHERISHED DEFENSE SYMPTOMS [4]

Many complaints in soldiers with "war neuroses" disappeared on the train from one hospital to another. Forms of incapacity incurable in the patient's home town are often relieved by a visit to some famous health resort, fabulous shrine, or advertised spring. Paralyses, contractures, aphonias, incurable by ordinary medical means, yield to some bizarre and publicly esteemed therapy. "Symptoms" are often unwittingly discovered and fostered for the service they render in confronting or evading unpleasant duties and responsibilities. Thereafter they cannot suddenly disappear except with damage to the individual's local prestige or honor, or injury to his self-esteem. But an impressive occasion, especially one with public therapeutic sanction, enables a dignified recovery. Therapy in such cases consists in providing an impressive occasion and thus justifying the transformation.

[4] Collateral reference: Hamilton, *Objective Psychopathology.*

COMPENSATORY REACTIONS [5]

These often arise as a neutralization of actual or fancied inferiorities. A belligerent pugnacity often characterizes those diminutive in stature. Bullying is traditionally recognized as a betrayal of cowardice. Obstinacy and inflexibility provide the stammerer with a mode of self-assertion that speech denies him. Scrupulosity and exaggerated ideals of promptness, cleanliness, honor, in trivial matters, often but cloak major forms of untrustworthiness. "Thou that judgest another, judgest thyself." A calloused, cynical attitude toward the misfortunes of others often betrays a nature prone to distress over others' ills, but awkward in ministering to them.

DISSOCIATED STATES [6]

As we have seen, growth and training involve as an important feature the integration or association of originally disconnected elements. Many mild abnormalities seem aptly described as a weakness in this established integration. Ordinary forgetting, drowsiness and sleep, absent-mindedness, automatic walking, writing, and talking, and the effects of various drugs, fall readily under the concept of dissociation. Hysteric amnesias, anesthesias, aboulias, and paralyses are explained in this way by Janet and others. More imposing clefts, between internally organized partial systems of memories, afford the descriptive basis for those marked dissociative pictures often dramatically designated "split personalities."

[5] Collateral references: Hart, *The Psychology of Insanity;* Adler, *The Neurotic Constitution.*

[6] Collateral references: Janet, *Major Symptoms of Hysteria;* McDougall, *Outline of Abnormal Psychology.*

REDINTEGRATED REACTIONS [7]

The "shell shocked" soldier is easily thrown again into a collapse resembling his original one by a sight or sound resembling some detail of his earlier experience. The sight of a surgeon's scalpel, or the odor of ether, may evoke nausea in the patient originally sickened by a distressing operation. A man was excused from jury service because every time the word "hospital" was spoken he fainted, thus duplicating an earlier reaction to a hospital experience. A horse once startled at a certain corner, thereafter shies or bolts when passing that point. A dog, occasionally whipped, trembles or slinks at sight of the stick or whip. A child, frightened by a bearded man, thereafter fears any large person, any one in a man's clothes, or even a hairy object such as a muff or Teddy bear.

Our earlier accounts of emotional gradation and transfer should be recalled at this point. When the single detail thus touches off a "redintegrated" response, without control or guidance by other details of the present scene or context, the response is neurotic. Failure to be guided by all or by many of the present stimuli, prepotence of details in spite of a context which if apprehended would be corrective, characterizes a certain humble type of intelligence. Such unsagacious individualities easily manifest an array of unguided redintegrations which make of them psychoneurotic personalities. Reactions of this kind, constituting neurotic pictures in the mature, may be normal to infancy and childhood, but are outgrown, in well endowed cases, with increase of intelligence, insight, and knowledge.

[7] Collateral reference: H. L. Hollingworth, *Psychology of Functional Neuroses.*

They may recur in later life on occasions of strain and exhaustion, drowsiness and distraction. In predisposed individuals they persist throughout life.

HYSTERIA, NEURASTHENIA, PSYCHASTHENIA [8]

Functional complaints may occur on the postural, the autonomic, or the cortical level. Thus they may involve (*a*) the sensori-motor systems, or (*b*) the vegetative, visceral, and thalamic systems; or (*c*) the systems of symbolic acts, including language and expressive gesture, with imagery. These give respectively the hysteria, neurasthenia, and psychasthenia of the clinic. Functional complaints occurring on any basis, if prominent, persistent, and systematic, may be assigned to such medical pigeonholes as these names suggest. This throws no light on their psychology, but it provides a convenient label for conversation and for official record.

In low intelligences, functional symptoms are more likely to be hysterical, to involve peripheral and overt disorders of sensation, movement, posture. Somewhat higher mental levels are more prone to exhibit the neurasthenic picture, one of vague or general bodily debility, with pains, aches, insomnia, cardiac irregularities, loss of appetite, nausea, hyperesthesis, loss of energy, inability to work, and the like. Psychasthenia is a name given to such symptoms as impulsions, fixed ideas, obsessions, aboulias, and similar debilities of mental control, decision, and volition. Such conditions are more common on somewhat higher mental levels, and seldom if ever occur on a mental age level lower than that of eleven years.

[8] Collateral references: McDougall, *Outline of Abnormal Psychology;* Rivers, *Instinct and the Unconscious.*

Among a group of 1172 neurotic male adults examined by the writer the typical mental ages of the groups were: hysteria, eleven to twelve; neurasthenia, twelve to thirteen; psychasthenia, thirteen to fifteen. Psychoneurotic symptoms have sometimes perversely been said to be more common among the able. The precise reverse is the case. Both in civil and in military experience such pictures go more commonly with intellectual inadequacy. These states represent functional disabilities, although they often occur on a background of organic injury. Their treatment is by the devices of psychotherapy. They are in fact only assemblages of such symptoms as we have already described in preceding sections of this chapter.

FUNCTIONAL PSYCHOSES AND PERSONALITY TYPES [9]

Some of the more severe complications of mental abnormality take the form of the psychoses. These are grave, more or less organized, and perhaps progressive alterations of conduct, thought, or feeling which may incapacitate individuals formerly unrecognized as abnormal by their associates.

Thus *dementia præcox* is the name given to a loosely defined set of pictures involving mental disintegration, dissociation of effect from object, apathy, loss of accessibility and contact with objective reality. It is sometimes characterized by states of stupor, catatonia, delusion, and commonly terminates in dilapidation of personality. It is conspicuously a disorder of postadolescence and early maturity, and seems to develop on the background of a shut-in, reclusive, fantasying, daydreaming, and introvert-

[9] Collateral references: Rosanoff, Hollingworth, *et al.*, *Manual of Psychiatry;* Paton, *Psychiatry;* White, *Outline of Psychiatry.*

ing personality make-up. There is some reason to believe that this psychosis, called functional because no structural basis has yet been shown to be responsible for it, represents a perverted developmental picture, on the basis of hereditary predisposition. It is possible that early recognition and intensive reëducation may do much toward prevention and relief.

Manic-depressive insanity, as its name implies, is an extreme picture of ideational, emotional, and motor fluctuation. There may be circular recurrence of periods of exuberance, alternating with periods of depression and lowered tone, interspersed with intervals of normal balance. Or various combinations and mixed states occur. One or the other extreme may appear more emphatically than the other, the dominant picture being then either excitement or depression. These alternations of mood and activity are accompanied by parallel bodily disturbance. No clear organic cause is established. The picture occurs on the background of a personality of the extroverting type, with early signs of an instability of mood and purpose. In mild forms this picture is known as the cyclothymic constitution. Such fluctuations, on a lower level of magnitude, are characteristic of all but the most phlegmatic people. Deterioration is not the rule in manic-depressive insanity. Instead recovery with probable later relapse is the more common experience.

Paranoia manifests a combination of such traits as extreme conceit, suspiciousness, a sense of some personal inferiority, and a rationalizing proclivity. It takes the form of systematized delusions, such as those of persecution, of greatness, of amatory favor, of power and authority, a divine mission, and the like. Mild forms are found in

many reformers, inventors, and cranks. These delusions commonly develop progressively about the concept of the self. Ideas of reference are found, personal traits and impulses are "projected" upon others, and elaborate delusions rationalizing the conduct of others may develop. Except for such disorders of judgment, no disorganization commonly occurs, and the individual may appear sane except on certain topics.

Less systematized paranoid trends often appear in other conditions, such as senility, dementia præcox, alcoholic insanity. In fact, that attitude of mind in which one saves and heightens self-esteem by projecting upon others the blame for his own failings, is in a mild form more or less characteristic of human nature at large. Nearly any one may observe transient delusional systems and ideas of reference developing from time to time in his own experience. The normal person becomes oriented to these trends; the paranoiac succumbs to them.

ORGANIC BRAIN INJURY[10]

Under this head we may note briefly certain facts belonging more especially in the field of neuropsychiatry. Associated with numerous forms of inquiry to the nervous system there may be parallel mental anomalies. Thus luetic (syphilitic) disease and other infections, chronic toxic conditions, concussion of the brain, surgical interference, hemorrhage, may involve mental symptoms varying widely in form and degree. Such disorders as fevers, focal lesions, glandular disturbance, brain tumor, poison-

[10] Collateral reference: Rosanoff, Hollingworth, *et al.*, *Manual of Psychiatry.*

ing, and the like, have attendant mental symptoms. Although such disorders may have their own characteristic developmental course (as in general paresis, toxic psychoses, and perhaps epilepsy), their detailed account belongs to abnormal psychology or to neuro-psychiatry rather than to developmental psychology.

BORDER-LINE CONDITIONS [11]

In far the greater number of psychopathic and neurotic individuals the condition is so mild and border line in character that associates commonly fail to recognize it as abnormality. Instead the individual is described as annoying, flighty, treacherous, unstable, without character, suspicious, unreliable, shifty, and so on. When complications do arise in such mild cases, the diagnosis is usually "Constitutional Psychopathic State." The border-line condition may represent an incipient degree of some condition later to be clearly manifested. More often it represents predispositions which will not become overt neuroses or psychoses except under unusual provocation. Such conditions and such individuals are better understood if the more extreme forms of abnormality are thoroughly familiar as a background of interpretation. Overt abnormalities represent the magnification and exaggeration, or perhaps the release, of ordinary human traits.

In recent years considerable inquiry has been made into the personality antecedents of nervous and mental breakdown, in the hope that even if such facts should not explain the incidence of disorder, they might nevertheless assist in explaining its form and course. Jung's descrip-

[11] Collateral reference: Kraepelin, *Clinical Psychiatry.*

tion of the "extrovert," prone to hysteria, and the "introvert," with psychasthenic inclinations, represents such an attempt. A relatively simple designation of fundamental personality types, representing tendencies all of which are "normal to infancy," is given by Rosanoff.[12] Adult balance is conceived as representing the adequate organization of these tendencies, in the light of social demands and obligations. Hereditary predispositions are blamed for the failure of inclinations, in individual cases, to submit to organization and control. The following "types" are described.

Normal Type. With balance, control, inhibition, stability, and relatively sound intelligence.

Antisocial Personality. Marked by predominance of illicit and selfish motivation, by delinquencies characteristic of immature children, the constitutional basis of hysteria and malingering.

Cyclothymic Personality. Comprising manic, depressive, irascible, and emotionally unstable tendencies shown normally in childhood in boisterousness, readiness to cry, distractibility, screaming with rage, and other tendencies which tend to sober down with maturity, or to become manic-depressive symptoms.

Autistic Personality. Appearing in children as painful shyness, mannerisms, autistic romance, incoöperation, and fantasy. If these do not run a benign course, in which they are outgrown, they become the basis for dementia præcox psychoses.

Epileptic Personality. Characterized by periodic alterations of mood, transitory periodic irritability, interrup-

[12] Rosanoff, "Theory of Personality based on Psychiatric Experience," *Psychological Bulletin*, 1920.

tions of consciousness, tendencies to delirium, ecstasy, and unreasoning prejudice. Represented in infancy in ordinary convulsions which are normally outgrown, but which if they persist, give the behavior picture of epilepsy.

We might well add to this suggestive list of "personality types," which may instructively be considered both in the case of marked abnormality and also in the understanding of "border-line" individuals, two further pictures. These would be, on the basis of the developmental account we have already given:

Inferior Intelligence. With special reference to those milder degrees of inferior deviation which escape identification as "feeble-minded" but may nevertheless be significantly implicated in delinquencies and resistance to the ordinary socializing influences.

Redintegrative Personalities. Referring to those individuals in whom proneness to unguided responses of the redintegrative type mark them as "lacking in sagacity" and incline them toward markedly neurotic or psychoneurotic behavior.

Such classifications of personality should be used with caution and with full realization of their wholly empirical origin. Their great advantage is that they emphasize the developmental feature of mental abnormality, and discourage the ready inclination to attach psychiatric labels and official diseases to individuals, in the place of seeking to understand them.

CHAPTER XVI

THE POST-MORTEM AGE—THE SURVIVAL OF INSTITUTIONS

TYPES OF IMMORTALITY

It might be supposed that the senile decay of the individual would mark the end of our developmental series, since the organism, up to this time identified with the self, has ceased to be. But it is psychologically a fact that the individual persists, as a dynamic force and influence long after death. We may point out various forms of persistence, with only some of which psychology has anything to do.

The classical form of immortality, the persistence of the psychic core, or soul, is not a proper psychological topic, since it involves the concept of features which are in no present way accessible to scientific observation.

The "immortality of the germ plasm" has been much stressed in biological literature. But since the *individual* is only an offshoot of this continuous stream of life, this biological immortality should not be confused with that of the individual, whose acquisitions, according to the best information, in no prescribed way effect the germ plasm and its life career. It is however true that the germ plasm has immortality only to the degree that individuals have offspring. So in a certain sense one may live again in children.

The acts of one's lifetime, the deeds committed, the in-

fluences exerted, continue in their effects on the conduct of others. Here in a genuine sense the individual continues to exist as a dynamic power, after life has ceased.

The works of one's hand also persist, and are a projection and continuation of the psychological individual. Ideas, books, organizations, modes of thought, long survive the body of their creator, and give to the psychological individual if not immortality, at least an extended life. Thus Plato still lives, as do Shakespeare, Pasteur, and Wilson.

Finally, *institutions,* of all kinds, embody the personality of those whose conduct first constituted them. Carlyle was convinced that institutions are only the shadows of great men. So languages, customs, laws, and values give to individuals a very real kind of psychological persistence. We may profitably consider the motivation of such perpetuation.

PERSISTENCE OF INSTITUTIONS

Leaving aside the economic, industrial, historical, political, and various other features [1] which determine the existence and continuation of institutions, let us consider only an array of factors of a more strictly *psychological* kind, which we suggest only as being effective along with other influences.

We may classify our remarks under twelve heads or principles; viz.:

1. Nonrational Origins and Survivals
2. Trial and Error Origins and Perpetuations

[1] A suggestive, though repetitious, account of the origin and progress of many familiar institutions is to be found in the volume by Müller-Lyer, entitled *History of Social Development.* We have found it useful to conclude a course in developmental psychology with the collateral reading of Müller-Lyer.

3. Old Institutions Serving New Needs
4. Survival through Habit and Inertia
5. The Technique of Analogy
6. Motives of Conspicuousness and Resentment
7. Contributions of Play and Esthetics
8. Devices for Propriety and Order
9. The Influence of Contamination
10. The Urge of Professional Advantage
11. Impressiveness as a Function
12. Social Selection by Institutions

NONRATIONAL ORIGINS

Close analogies may be drawn between the way in which reasoning goes on in the individual mind, the way a committee arrives at its conclusions, and the way society develops and maintains its institutions.

Many of the individual's conclusions are nonrational in their warrant. He chooses an occupation, a place to live, a wife, accepts a political candidate or rejects a philosophy, for no reason at all except that he prefers or detests. He believes in monogamy, in socialism, in pragmatism, just because these fit into his temperamental bias, tickle his fancy, minister to his instincts, flatter his vanity, calm his fears, pique his curiosity, amuse or entertain him. Thus the fact that the candidate is from his own state, or graduated from his own college, determine his choice of a man to administer the affairs of the nation. In a recent election a man was heard to remark, "I am going to vote for Mr. X. My wife's brother knows his father." Acts and decisions thus arise in many cases on a nonrational basis, on emotional or instinctive grounds.

Thus also arise in primitive life many institutions of burial, of sacrifice, of taboo, and respect, restrictions of marriage, of barter, of conversation, and of general conduct. The corpse, the ghost, or the enemy is feared. Throwing food to the ghosts, paying respect to the corpse, sticking an effigy of the enemy full of pins, to express or relieve the actors' fears, and the ceremonial thus arises. It soon assumes a propitiatory character, then a magical character, developing into the rituals of religious observance on the one hand and the procedures of science on the other, or into the technique of political organization, as in the tribal dance.

The forms of letters thus arose not on the basis of their legibility, as measurement easily shows, but for their ornamental value in decoration. Vehicles, farm implements, and box cars are painted red and yellow rather than black, not merely because of the easier availability of those colored clays, but in part because of the symbolism of black. Neckties and collars develop, not for purpose of utility but because they give a frame to the features and afford spots of contrast and color. Clothing originated as an ornament, and its protective value was secondary.

TRIAL AND ERROR ORIGINS

Just as the individual's acts are often but the result of trial and error groping, certain acts surviving because they satisfy persistent needs, without having been clearly analyzed, so many human institutions seem to represent the product of a similar series of failures and partial successes on the part of the race. The raccoon who stood on his head in a corner of his cage and by so doing happened

to kick open the latch that released him and procured him food, continued thereafter to stand on his head in the corner when food was in sight. The trial and error character of the whole performance gave it persistence as an unanalyzed whole.

Thus after many and varied trials, under a variety of circumstances, monogamy and the private family seem to have survived as the most useful solution of sex relations and the care of children, in a population in which males and females are not far from equally numerous. Hanging seems to have survived as the most convenient and effective mode of killing a man publicly. Knives and forks have survived as the best implements for eating. Wheelbarrows have come to have one wheel instead of two, and cow's milk has won in the contest with goat's milk.

Tables and lecture platforms, door knobs and keyholes, have come to have a conventional height from the floor. Just as in industry the better techniques and instruments come in time to be adopted, even if slowly, so in social control the means that survive have often done so simply because they serve the purpose better than anything that has yet been accidentally hit upon. As conditions change, we may expect to find variation, in time, in these institutions. Thus the institutions of the family, of slavery, of the individual kitchen, the private school, the hired army, and classical education, are in our own day undergoing such revision, as experiment and accident reveal better devices.

OLD INSTITUTIONS SERVE NEW NEEDS

Methods and devices hit upon for one use are often continued to serve new needs. Baptism, originally a magical

ceremony, survives as a symbol of fellowship and good intention. The masts of sailing vessels survive as lookouts and as supports for the apparatus of the wireless outfit. The Sabbath survives as a means of recreation and sociability. The confessional survives as a technique of psychoanalysis, when penance and the sale of indulgences are forgotten or perfunctory. Stairways survive as fire escapes. Initiation ceremonies survive as graduation exercises, gargoyles as water spouts, totem poles as hat racks.

The legal oath, once a self-pronounced curse or invocation, survives merely as a means of promoting the fidelity of testimony and of impressing men with the seriousness of court activities. The horrible disguises and fearsome headdresses of savage chiefs and medicine men survive in a moderate form in the robes of justices, the hoods of cardinals, the headgear of army officers and drum majors. Thanksgiving becomes merely an occasion for an early winter holiday. Veils are no longer worn to protect from the evil eye or to prevent conception, but merely to preserve the complexion or to pique the curiosity. In many cases, indeed, the new needs supposedly served are very farfetched and dubious. They seem to be, on the whole, mere rationalizations of a procedure which is perpetuated by sheer inertia.

Our modern election ballots bear opposite the name of each candidate what a stranger to this world would call his *totem*. Thus we find a rooster, an eagle, a bull moose, a donkey, a torch, a pitcher, and the like. We who are sophisticated say that these are merely the *marks* of the Republicans, Democrats, and so on. But the institution is as fixed as are the totems of simpler tribes, and is probably no more significant.

Originally these signs, as is the case also with trade-signs and trade-marks, served to inform the *illiterate.* It is interesting that they should so definitely survive still as a useful guide to the votes of democratic citizens, or do they serve merely as slogans, as badges, and social emblems?

SURVIVAL THROUGH HABIT AND INERTIA

Mere habit and inertia, as we have suggested in the preceding case, and the fear of violating the supposedly "natural" or the established, perpetuate many institutions and customs, long after their utility has ceased, and often much to the impediment of the actors.

Chaperons are required after the conditions have disappeared which gave rise to them. Kings are maintained after their monarchical functions have been lost. Faculty meetings continue to be held even when the administrative officers have usurped all authority. Grace is asked long after piety ceases. Old shoes and rice continue to follow the bride and groom, unused candlesticks clutter the artificial mantel, stone pillars adorn the village streets or the city commons long after hitching posts are abandoned in practice. Brass knockers, accompanied by an electric push button, decorate the front door of New York apartments; walking sticks are carried even when they are a nuisance; and clerical assistants in the offices of the Surgeon General wear spurs, at least in time of war.

In architecture and other permanent forms of art this tendency is conspicuous, and clothing is replete with such archaic vestiges. Gauntlets are worn on gloves long after swords and rapiers are forgotten. Buttons are worn on the back of coats, although horseback riding is a lost art.

The courts and legal technique, again, are full of these relics. The ignorant and illiterate peasant of medieval days pointed at a cross marked on the document, declaring that although he could not write his name he acknowledged this cross as his own individual mark and sign of agreement. The notary public of our own day still affixes a red label to deed or will, and we, after having signed our name in unmistakable chirography, point to this bit of red paper and declare solemnly that this is our seal.

Brides are no longer bought and sold, nor are bonds required of the prospective husband, yet gifts, engagement rings, and wedding rings form an essential part of courtship and marriage. Divorce is easy and convenient, as well as increasingly common, yet we solemnly swear to cherish and protect, to love, honor, and obey "till death do us part."

Foods are now prepared in the bakery and factory, clothing is made in the shop, teaching is conducted in the schoolroom, and disease is treated in the hospital. But the domestic woman, sitting sedately in her armchair, neither producing nor conserving, survives as a relic of days gone by, or is converted into a medium of personal advertising, an object of esthetic contemplation, or a meddler in the lives of others. Swearing, originally tabooed on account of actual fear of the invoked curse, now survives as a vestige.

THE TECHNIQUE OF ANALOGY

Through analogy, acts and attitudes are carried over to new situations and there maintained with many of their irrelevant details. We make wry faces at a bitter taste,

and spew the offending substance from the mouth. Hence to make a face at and to spit upon means to revile, and we apply the technique to people, to flags, and to principles. The serf salutes his lord by falling upon his face, baring head and neck for the imperial sword if it be forthcoming. We abbreviate the act, but still we bow the body and tip the hat. The soldier rises, ready for prompt obedience and action when his officer appears. Therefore we stand in the presence of the mayor, the dean, or the magistrate. Primitive men carried the heavy and immobile shield in the left hand to protect the heart, and wielded the more nimble weapon in the right hand. We have abandoned the shield and turned the sword into a plow share, but we still reserve the left hand for heavy burdens and entrust the delicate coördinations to the right.

Why are women's watches, valises, umbrellas, opera glasses, fountain pens, knives, made generally *smaller* than similar articles for men? Does it indicate, as some have suggested, merely that the interest of women in "little ones" is attracted to small objects through the subtle working of analogy? Or is this but a transfer from the tendency to make women's gloves and shoes smaller because of their smaller physique? This tendency, being justified and established on utilitarian ground, then spreads to all things associated with women, merely through analogy. There is no evidence that women prefer small things for the sake of their smallness, nor that the small thing symbolizes maternal interest (as McDougall suggests). Women do not insist on small bank accounts, houses, farms, nor even on small hats.

CONSPICUOUSNESS AND RESENTMENT

Once an institution is established, even after it has long lost its function and utility, individuals perpetuate it for fear of becoming conspicuous. Thus, a man may agree that it is now appropriate for women to engage in profitable employment, but fear that if his wife does this it will be supposed that he is "unable to support her."

In just this way, Pope declared the motto—"Be not the first by whom the new is tried, Nor yet the last to lay the old aside." Even if we do not believe in high heels, stiff collars, short or long hair, white shirts, and pointed toes, we wear them anyway, since it really makes little difference, and to drop them would only mark us out as eccentric. Moreover, the mere difficulty of finding on the market more suitable goods urges us to continue the old practice rather than go to the extra effort. Any one who depends on retail stores and ready-made products knows the heavy weight of this tendency.

Another curious psychological fact is also closely connected with this point. The main group, who patiently suffer the abhorred custom, readily develop resentment against those who have the initiative to drop it and thereby reap a personal advantage in expense or comfort. Thus some parents with many children, and consequent worry and expense, decry the spread of knowledge of birth control, and condemn those who by using it secure advantages the others have lost. Perhaps it is for a similar reason that parents so commonly insist that their children shall experience the same penury, fears, and obstacles they themselves had to endure.

In war, it is noticeable that men who have been bullied

or persuaded into giving money to the myriad relief agencies and welfare enterprises, or who have bought large blocks of bonds at a sacrifice, band together to compel all others to do so. One man refused to pay an "assigned" amount which he had been assessed by the Red Cross agents, saying that he would give what he pleased and if he pleased. Other business men, who had already been made to pay their "assessments" thereupon combined to boycott his business. It was clear to the observer, that the motive might have been expressed—"We had to pay and now he's got to suffer along with us."

CONTRIBUTIONS OF PLAY AND ESTHETICS

Institutions arising on a basis of utility may survive only as play activities or as esthetic objects. Marriage festivities, the college commencement parades, the faculty regalia, initiation ceremonies of lodges and fraternities, Halloween parties, harvest celebrations, house warmings, roof-tree ceremonials, "showers," fall in this class.

In architecture and plastic art, in furniture and dress, these tendencies are conspicuous, and perhaps many of the relics and vestiges here found have a justification as esthetic elements or forms. In religious ceremonies the altar, the incense, the symbolic ceremonials, the statuary, the hymns, and the chantings sometimes lose their original meaning and become dramatic and musical entertainments. The walls of stucco buildings and of tin-covered buildings come to be marked off into brick-like patterns, probably not in order to appear to be bricks, for this they never succeed in doing, but as a familiar pattern of decoration.

"In the Middle Ages popular reprobation was manifested

by celebrations which were always grotesque and noisy and sometimes licentious. They were called *charivaris*. They were enacted in case of the remarriage of widows and sometimes in the case of widowers." [2]

These customs we have perpetuated under the same name, especially in rural, frontier, and western communities. But they no longer serve as a method of community remonstrance. Instead they are perpetuated merely as a bit of playful sport associated with weddings, and as a device whereby the groom distributes a bit of food or drink to the boisterous populace, usually to those not invited to the wedding. Probably this habit of giving something to those taking part in the charivari, whereupon they cease their noise and depart, is a survival of some sort of fine or penalty exacted formerly from those whose acts met with disapproval.

DEVICES FOR PROPRIETY AND ORDER

Many institutions, originally of a definite and specific utility, are perpetuated merely for their value in scheduling human conduct, in eliminating decisions of choice, in standardizing expectations and obligations, and in reducing the personal factor in our economic and social relations. They come to be rules of the game and lose their former meaning. Most usages of etiquette are of this nature. The formalities of teas, balls, the rules of introduction and acquaintance, the parliamentary rules of order, the hierarchy of precedence in parades and diplomatic occasions, the conventional dress of particular occasions, the symbols of mourning, of engagement and marriage

[2] Sumner, *Folkways*, p. 391.

rings, the use of names and prefixes, the names of offices and of academic degrees, all these give order to associations which would otherwise be full of clash and personal decision.

Here belong the ceremonies and the proprieties of *intercourse* as distinguished from those of *record,* a distinction clearly drawn by Ross.[3] The proprieties seem to have been originally, on the one hand, acts of propitiation and servility, calculated to induce favor or procure mercy; and on the other hand, acts of self-respect, calculated to induce humility, obedience, and esteem and to emphasize the gaps between social classes. In part, both these persist, but they survive even beyond these points for another purpose, that of making smooth the path of intercourse, the setting of mutual restraints, and the recognition of personal sanctities. They curb over-familiarity and they keep others at a distance. They are dropped in the bosom of the family or among intimates, where proper regard and affection is taken for granted. Confucius said, "The ceremonial usages serve as dykes to the people against bad excesses to which they are prone." In the *Sacred Books of the East* it is recorded, "For securing the repose of superiors and the good order of the people, there is nothing better than the Rules of Propriety. The Rules of Propriety are simply the development of the principle of reverence."

The rule of the road is a good example. Why do we "pass to the right"? Originally presumably because that enabled one to wield the spear in the right hand, and thus to put the shield between one and the passer-by, who was like as not an enemy. But now we do it only as a means

[3] Ross, *Social Control.*

of securing order and facilitating traffic. In some countries the opposite rule is followed.

THE INFLUENCE OF CONTAMINATION

Institutions may arise on the basis of the perversion, contamination, or adaptation of those borrowed or imported from other sources. Words, for example, may be borrowed from a conquering, or an enslaved race, from travelers, missionaries, or neighboring groups, but put to new uses through being misunderstood or blended with local conceptions.

Thus, an Indian tribe, adopting the institution of Thanksgiving, would certainly contaminate it as a festive occasion, with their own practises, their own superstitions and religion, their own myths and observances. It may thus originate and survive as an institution with a very obscure and confused meaning and utility. So Americans, adopting British football on a background of their own game of baseball, transform football into handball, but the old name persists, along with some of the original features of the game.

THE URGE OF PROFESSIONAL ADVANTAGE

Institutions may be perpetuated by professional groups and special classes for motives of personal profit and advantage. Here the true motive may be concealed and a fictitious one given if the institution is challenged. Twilight sleep as a method of childbirth aroused the vigorous resistance of medical men in general. Was this under the apprehension that it would either reduce or prolong the period of medical attendance and nursing?

Overalls may be worn generally through the special endeavors of the manufacturers of denim. Old-fashioned typewriters may be perpetuated until the stock in hand is exhausted, leases expired, or the factory equipment worn out, before new devices are introduced. Gold teeth will be worn so long as dentists make greater profits from their prevalence. For this reason, in part, Indians on the reservations sport many gold teeth, acquired at the time when their annual payments arrive.

Large families will be the rule and methods of birth control tabooed and illegal so long as obstetricians have their way. Indulgences for sin will continue to be sold so long as occasional crafty men can keep up the system. Latin and Greek will be required studies until the old generation of classical experts has retired or deceased. The ruling values, in general, will vary with the class in power.

As Ross [4] says, "Social control takes the tinge of the source from which it springs. When the reverend seniors monopolise power, much will be made of filial respect and obedience, infanticide will be a small offence, while parricide will be punished with horrible torments. Let the priests get the upper hand, and chastity, celibacy, humility, unquestioning belief, and scrupulous observance will be the leading virtues. The ascendancy of the military caste shifts the accent to obedience, loyalty, pugnacity, and sensitiveness to personal honor. When the moneyed man holds the baton, we hear much of industriousness, thrift, sobriety, probity, and civility. The mandarins and *literati* have no moral program of their own, but they are sure to exalt reverence for order, precedent and rank.

[4] Ross, *Social Control*, p. 85. (Copyright, 1901, by the Macmillan Company. Quoted by permission.)

The élite, whatever ideal they champion, will be sure to command the ordering of one's life according to ideas and principles, rather than according to precedent and tradition."

IMPRESSIVENESS AS A FUNCTION

Many institutions and customs again are originated or perpetuated simply because of their *impressiveness,* and of their consequent effect. Here belong what Ross calls the ceremonies of *occasions,* as distinguished from those of *intercourse.*[5] This author writes as follows:

It is a feature of early society that all important occasions in the life of the individual are solemnized by the public performance of rites. The great mass of these are probably intended to impress rather than to control. The formalities connected with the transfer of real estate, the contracting and paying of debts, the making of wills, marriage, adoption, disinheritance, succession, the emancipation of slaves, etc., suited as they are to make vivid and lasting impressions on the minds of witnesses, are necessary to authenticate transactions in days before documents and records are possible. They call attention to the fact that something important is happening and by their mysterious and unusual character grave deeply on the memory of spectators that which now we trust to deed and note and register.

In many cases, however, the ceremony of occasion is something more than a means of record. We find that the occasions most scrupulously accentuated by public formalities are those which mark a change in the relations of the individual which involves the acceptance of new responsibilities. The recognition of a newborn child, the attainment of manhood or womanhood, the coming of age, the inheritance of family property, the succession to the headship, marriage, adoption,

[5] Ross, *Social Control,* pp. 253-254. (Copyright, 1901, by the Macmillan Company. Quoted by permission.)

initiation, confirmation, naturalisation, the promise of allegiance, enlistment, installation in office, ordination, compact and treaty—these, though they are events of very different importance, have this in common, that they bind somebody to do for others, for his family or for the group at large, what hitherto has not been laid upon him. Sometimes, as in christening or enlistment, the obligation is one-sided; sometimes, as in marriage or adoption, it is mutual upon two parties; and again, as in baptism, ordination, or coronation, it embraces the beholding public.

He calls attention to the fact that *leaving* such relations is not accompanied by any such elaborate ceremonials, thus in divorce, mustering out of service, resignation, the ceremonies are simple. Court begins with pomp but adjourns with simplicity.

Why should this be unless ceremony promotes the performance of these obligations,—is, in sooth, a means of control? Note that it is symbolic. The picturesque, dramatic or sensational will serve to impress an event upon the memory; but the ceremony that modifies the feelings must be full of meaning. It dwells on that which would be forgotten, and so reveals the full significance of what is being done. Thus, in marriage the carrying away of the bride, the pretended payment for her, the "giving" her away, her whipping by the groom, etc., are ways of signifying that the girl's allegiance to her family has ceased. The . . . drinking . . . together, the joining of hands, the exchange of bracelets, the tying together of garments, symbolise the intimacy of the new relation. The service of ceremony therefore consists in so stimulating the imagination by appropriate gestures, actions, and words as to call up the conception of something vaster in power, life or numbers than the here and now—God, society, the dead, or the unborn.

SOCIAL SELECTION BY INSTITUTIONS

Institutions once established come in turn to select an amenable type for prosperity and ultimately for survival, just as the original type at first selected the institution. Monogamy selects for survival those individuals whose inclinations are monogamic. The law selects those who are by original nature orderly and peaceful. Agriculture, where it becomes established, selects the domestic type, sheep herding the solitary, small town and city life the gregarious.

Institutions thus become a real part of the environment. The circle involved may be a vicious one, since the institution, arising on the basis of particular needs and tendencies, thereafter propagates the very tendencies it was established to serve. But it need by no means follow that these are the more hopeful or desirable traits.

The institution of property thus favors the prosperity and survival of the acquisitive, and it also warps the neutral cases to this mould through the early influences of training and precept. But it may well be that in the long run acquisitiveness should be rooted out rather than preserved.

SUMMARY

In the foregoing survey of some of the typical motives underlying institutional persistence, perhaps three points are of the greatest significance. The first is that there is a close analogy between the way in which customs compete for survival, in the group, and the manner in which ideas are found and selected in individual thinking. The second point is the emphasis of the "institutional" character of

countless trivial practices, not always dignified by the use of that word. The realization that church, state, university, the family are no more independent entities than are the charivari, the mode of salutation, baptism, and the like, may assist in dispelling the concept of institutions as superindividual structures. Finally, institutions are but the prolongation of types of action originating and continuing in individuals. An individual's psychological life may be described as persisting so long as his acts exercise a determining influence on the acts of others. In the study of the more imposing institutions, as this is encountered in sociology, history, ethnology, jurisprudence, and the science of language, the individual influences are submerged by one another. It is at this point that the study of social evolution follows upon the inquiries of developmental psychology.

CHAPTER XVII

GENERAL DEVELOPMENTAL LAWS

Science is seldom satisfied with the enumeration of the details of a process. It seeks also for general formulations, for net tendencies, for principles and laws. Of course scientific laws are not constraints imposed upon phenomena; instead, they are only generalizations of the concrete ways in which phenomena occur. The student of development is no exception to this rule. It is interesting not only to recount the course of mental growth, by a delineation of its detailed events, but also to seek for general statements. Some general statements may summarize only a particular process; others may perhaps apply to diverse fields or topics; statements of both these kinds have scientific value.

Are there general laws of development? One should be careful not to force generalizations upon the facts; instead, the former should be derived from the latter. As we have seen, our knowledge of human development is far from complete. Such general statements of its course as may be offered will be subject to numerous qualifications, exceptions, and degrees of doubt. Any expression of developmental laws must be clearly understood to be tentative. Perhaps a useful procedure for the present is that of noting such general tendencies as have been suggested, and observing features of development which either conform to them or contradict them.

Several preliminary cautions may be in order. A law formulated for the embryonic growth of the body may not be applicable to its postnatal psychological development. A generalization applicable to the historic steps in the evolution of such an institution as money, transportation, or language, may have no clear relevance to the stages of individual progress, even in the use of those institutions. A formula that may apply to the changes in some restricted human capacity, such as ability to draw or to talk, may not apply elsewhere, and may not be a general law even in the case of all individuals.

Moreover, two general laws, both of which may tend to be relevant to a given process, may be contradictory, and may thus lead to very complicated actual events, or to complicated qualifications of both the original laws. With such warnings in mind, interesting reflection and discussion may arise in the effort to derive general laws of the development of the human mind. Illustrations or material may be sought either in individual growth, or in special fields, or in the development of particular institutions and practices.

1. *Spencer's Formula.* Herbert Spencer[1] formulated, as a description of the process of development (evolution), the following well-known and once much debated definition. "Evolution is a change from an indefinite, incoherent, homogeneity, to a definite, coherent, heterogeneity, through continuous differentiations and integrations."

We have noted something like this process in the development of language. The initial "spontaneous" vocal sounds are vague and unrelated utterances, with little variety, common to the infants of all races. In the course

[1] Spencer, *First Principles,* fourth edition, 1880, p. 473.

of individual linguistic development these sounds become differentiated widely, and integrated into words, into phrases, and into sentences. Thus results a definite and coherent language structure, great heterogeneity of vocal utterance, and the many different languages of human beings.

In the acquisition of any act of motor skill something like this history can be made out. A more or less random repertoire of equivocal and ambiguous movements is gradually superceded by patterned responses which are highly organized, differentiated, and internally related. We have also seen in emotional development the way in which an intricately differentiated hierarchy of graduated discriminative emotional responses evolves from a background of relatively few, simple, and undiscriminative tendencies. In play also, the various complex varieties of intellectual game, and the highly integrated modes of group sport, develop out of very vaguely differentiated initial impulses to general activity.

There are at least some features of development which seem to illustrate Spencer's formula. But the law is not descriptive of all aspects of development. Thus the standardization of adults seems to involve the suppression of individual differences (heterogeneity) in favor of a conventional type or pattern. And the human embryo is far from being indefinite and homogeneous in its composition. Differentiation, organization, are present in the very beginning. Even sperm and ovum manifest material heterogeneity and definiteness of structure. And those developmental features that involve decline or loss of parts, such as the changes of senility and of psychosis, often display sequences quite the reverse of those required by the

Spencerian formula; development proceeds in these instances from a highly integrated condition to one of less organization.

But even in embryology it is true that cells initially indistinguishable acquire differentiating locus, shape, and function, and that increasing differentiation and integration are in many ways characteristic of physical and social as well as of mental growth. Thus Müller-Lyer [2] concludes that: "the essential characteristics of the process of culture are the same as those of organic development, of which it is in fact a continuation. . . . In both developments the movement goes from small to great, from simple to complex, from homogeneous to heterogeneous, and in these processes of increase, combination and differentiation (along with integration) lies progress—and it lies in nothing else." The law of Spencer, we may conclude, is thus a suggestive but by no means a final nor a universal law of development.

2. *The Law of Recapitulation.* (Hæckel, Herbart, Hall.) This law, as we have seen, takes three forms, as follows: (*a*) Ontogeny repeats phylogeny; (*b*) Early activities duplicate typical behavior of earlier forms; (*c*) Individual postnatal development parallels human history.

That in its first form the law applies to the growth of the human embryo and fœtus, if only in a rough way, is the common verdict of biologists, though even here there are dissenters. But we find no justification for the application of this form of the law to postnatal mental growth.

As for the second and third forms of statement, our discussion has shown that, in so far as they apply to mental activities, this is not because of any intrinsic neces-

[2] Müller-Lyer, *The History of Social Development*, p. 349.

sity. Instead the appearance of similarity arises through the occurrence of developmental analogies, through the principle of economy, and through the common limitations of resource, environment, and insight That such analogies may occur is an interesting fact, and may suggest common principles underlying many developmental processes. But that they happen because of an inner compulsion or innate law of growth whereby one process "imitates" another, the evidence denies.

3. *The Law of Germinal Continuity.* In its biological form this is Weismann's doctrine [3] of the relative independence and continuity of the germ plasm. The germ plasm of the parents produces on the one hand the soma, and on the other the germ plasm, of the child. The former (soma) lives its life and dies. But the latter may multiply, and parts of it may leave the body and in turn develop the germ plasm and the soma of another individual. The soma is a transient vehicle. The germ plasm is a continuous stream.

Is there anything resembling this in psychological or in social development? It seems possible at least to find analogies which are not entirely fanciful. The "self" of the individual is a relatively (though far from completely) persisting core that threads the successive acts of his life. Through the vicissitudes of experience certain more constant sensations, memories, and habits endure. Each joy or sorrow has its day and departs; each choice or decision, each mood and purpose, is transient. But each is felt as the act or possession of that more abiding fact, the self. Infancy, childhood, adolescence, maturity, and senility approach and recede; but all these are felt as stages of a

[3] Weismann, *The Germ Plasm.*

single line of growth, as episodes in the existence of the self that participates in turn in each.

And in social change the "instruments," which are often loosely confused with the "institutions," also afford an analogy. Tools and dwellings, canals and boats, libraries and factories, may persist through changing ownerships, and may outlast generations. Certainly the furniture of earth and "the choir of heaven" fulfill this function. Social change therefore no more often occurs in a vacuum than is the new infant presented by the stork. Each generation's acts are in part directed toward the same objects that preoccupied its progenitors. And these objects bear many of the marks of earlier attack; they are to some extent shaped by earlier manipulation. In the social sphere, then, man's physical environment in many ways resembles the self of the psychological individual and the germ plasm of the organism. It is the relatively continuous thread along which are strung the episodes of social history.

4. *The Law of Pattern.* That development involves not merely enlargement, but also diminution, both absolute and relative, loss, new acquisition, and change of proportion, was asserted early in our account. Every field of mental growth has illustrated this law of pattern. Bodily changes, the acquisition of capacities, the formation of interests, their shift and decline, the elaboration of vocabularies, constitute examples in individual life. Further examples are to be seen in the appearance and disappearance of glands (thymus), the reflexes (Babinsky, grasping), in the senile changes in sensory range and acuity.

In social change the law is realized in the shifting of institutions and customs, the introduction of inventions,

modifications in political and industrial organization, and even in the trivial and fugitive habits of speech, of entertainment, of dress, and diet. The development of civilization is far from being merely a magnification of primitive ways; some of the old is dropped, the new is added, and the emphases shift.

5. *The Fundamental Precedes the Accessory.* (Hall, Bolton, Bryan.) This suggested law has various applications, and numerous exceptions. Even in the field of muscular growth we have seen the difficulty of stating just what the fundamental is. Thus we cannot, with satisfaction to the facts, indicate the fundamental either as the large muscles, as the more primitive ones, nor as those closest to the trunk. But it is clear that in acquiring an act of skill it is often the grosser and more essential acts that are first mastered, the details of form and finish coming later. So also in acquiring speech the earliest words learned are those which will cover many occasions, the common nouns, verbs, and adjectives. Accessory verbal elements come later, and still later the more precise but less fundamental features of mood, tense, number, and the principles of syntax. In general acts of perception the law is often illustrated.

Even in reading, words are recognized as total structures or forms before they are apprehended through spelling, and words may be read under circumstances of distance, size, or illumination which make the perception of the constituent letters doubtful. So also in developing trade skill one is likely first to master the "fundamental operations," those which are more often needed or are more indispensable. The expert is distinguished from the ordinary workman more often by his mastery of the acces-

sory operations than by better performance of the fundamentals.

On the other hand there are cases in which the law seems to be quite reversed. Thus in learning to write, as distinguished from the development of reading, the letters must be learned before even the total word form is produced. Shall we then say that here the letters are fundamental and the form accessory? But this reduces the law to a tautology—so much as to state merely that what comes first is first developed. The tones must be produced before the melody exists; yet the melody is a total fundamental structure or pattern which may be transposed bodily, or rendered in very different tones. The law, in some places suggestive, is in others doubtful, and the difficulty appears to lie in the varying definitions of what is fundamental and what is accessory. In many cases of development this distinction does not seem relevant; instead all the features of the process must be considered coördinate details and their order of development must be otherwise formulated.

6. *Appreciation Precedes Execution.* This law at least finds many points of apparent application. We read before we write; we understand words before we can talk; we recognize before we can recall. Sensory equipment precedes motor activity, and the "late development of the motor tracts in man" is illustrated in the order of myelination of nervous pathways. Adolescent vocational interests and aims far outrun proficiency, just as desire to mate precedes economic readiness for this act and its consequences. The adult enjoys music which he cannot perform, thrills at orations which he cannot deliver, and appreciates works of art which he cannot duplicate. Many

have wants they are unable to gratify; few have more resources than they can spend.

On the other hand, there are undoubted exceptions to the rule. Thus many mathematical feats are appreciated only by those able to perform them. In many games, as in some of the fine arts, only those who can accomplish the trick are able to evaluate it or even to enjoy it. On the other hand, appreciation may outlive execution, and senescence may be full of delight in feats which only youth can achieve.

7. *The Law of Developmental Asymmetry.* According to this law development often appears to be zigzag, or discontinuous, rather than uniform advance along the whole front line of progress. Rapid growth occurs or becomes obvious now here, now there, and may seem at certain points to come by leaps and bounds. We have found numerous illustrations of such an appearance. Some capacities mature early, others late; while one function is inert and relatively static, another is rapidly maturing or declining. In old age, memory may fail while capacity for argument is still intact; hearing may decline while vision is yet keen. In childhood, talking may lag while walking is rapidly developing; or the reverse may occur. In learning, indeed, this is the conspicuous rule; while perfecting one act we neglect others. Our voice culture suffers while our golf is improving; the tennis player ignores speed while acquiring accuracy or form; to master the multiplication table we must neglect our drawing, until we come back to it again.

In many respects, and especially in the case of extrinsic determination, human development is piecemeal and fragmentary, a gradual building rather than a general swelling.

And in the case of processes more strictly determined by intrinsic factors, the facts of differential rates of growth result in the same picture, even though in any given process the gain is continuous rather than saltatory.

8. *The Law of Creative Synthesis.* Creative synthesis is a term used to describe a combination of elements to produce a resultant of such a nature that the whole is more than the sum or aggregation of its parts. Such a resultant may manifest attributes that are unique, and not characteristic of any of the elements taken singly. Thus in chemistry the combination of oxygen and hydrogen in certain proportions produces water, a unique resultant with properties possessed by neither of the elements. So also a melody is not merely a collection of tones, it is a tonal synthesis in which appear features not displayed by single sounds.

Some observers accept this law as an important feature of both physical and mental development. Thus Conklin [4] writes that "by the interaction with one another of substances or parts originally present, and by their reactions to external stimuli, new substances and parts appear which had no previous existence." And "new functions appear in the course of development which are not merely sorted out of the general functions present at the beginning, but which are created by the interaction and synthesis of parts and functions previously present." "Doubtless every part of the eye is functioning in a general way during the entire development, but not until all parts are formed and connected and all their functions are synthesized does the new function, vision, spring into existence."

Cases are easily found which seem to illustrate this

[4] Conklin, *Heredity and Environment*, pp. 40, 41, 187.

effect. Thus in learning to walk, the constituent movements are all possible for some time before that special integration of them occurs which constitutes the novel feat of locomotion. Thus also the isolated letters of a word have their own characteristics, but the word and its meaning are more than a mere aggregation of these letter features. So the meaning of a sentence depends on the word sequence and pattern, and is not to be found in the meanings of the words taken singly. Wundt [5] writes that, "every psychical compound shows attributes . . . which are by no means to be looked upon as the mere sum of the attributes of these elements. A compound clang is more, in its ideational and affective attributes, than merely a sum of single tones . . . and in the activities of imagination and understanding this principle (creative synthesis) finds its expression in a clearly recognized form . . . as for example in a work of art or a train of logical thought."

It must be said however that "creative synthesis," if used only as the name for a process the intimate nature of which we do not understand, easily leads to notions of occultism and mysticism, rather than to the promotion of scientific understanding. The statement of the principle often results from the ignoring of certain of the actual properties of the "elements." Thus one of the properties of oxygen is surely that of uniting with hydrogen to produce water. And the special meaning conveyed by sentences comes not from the mere putting together of words but from the fact that special responses have been attached to a set of words thus put together. On the whole, while the process of creative synthesis may be a

[5] Wundt, *Outlines of Psychology*, pp. 368, 369.

convenient indication of many interesting results which we do not understand, it should be considered as a mode of expressing a problem, rather than a formula for disposing of it.

9. *The Law of Determination.* Progress often seems to involve something more than mere succession of details or events. There may appear also a specific *direction,* a goal or motive. This is sometimes called control by purpose or by determining tendency. The "end" or result seems to act, either directly or indirectly, as a determinant or influence in the course of preparatory events. Thus with the fertilization of the ovum some impulse is given which may picturesquely be said to "strive" toward the production of a particular adult form, even in the face of obstacles. Some biologists are so impressed by this appearance of direction or aim in embryology that they repudiate simple mechanistic concepts of growth and invoke a vitalistic factor such as "entelechy" or "purpose." (Driesch, Bergson, McDougall.)

So also in human thought and action there is more than the mere succession of ideas and movements, there is the motive or problem, which sets going the train of action or thought, and in part determines both its direction and its point of cessation. The subject of drive, motive, and determination is a very obscure one, and it has invited various forms of fantastic speculation and occultism in psychology as well as in biology. Most of these "hormic" factors seem to be only declarations that there are many things we do not yet understand, and it is very doubtful whether insight is promoted by giving names to our ignorance.

10. *The Law of Redintegrative Substitution.* One of

the most significant processes in development, as we have abundantly seen, is that in which a partial detail of a stimulating situation comes to function for the whole situation in instigating a similar but commonly a less vigorous response. We have seen this law illustrated in the acquisition of voluntary control, in the development of language, in the gradation and transfer of emotion. Its presence underlies the various levels of speech understanding and use characteristic of the degrees of intellectual development. This is also the fundamental process involved in perception, in memory, imagination, and thought.

Capacity for symbolism depends upon the facility for this part-whole substitution, as do also many modes of esthetic response, various neurotic symptoms, and the limitations in many ways of vocational aptitude. This mechanism is characteristic of all the higher mental processes; indeed it is by some believed that only such acts as exhibit this feature should be called mental. Certainly without this redintegrative substitution that which we commonly know as mental development could not occur.

Many different names have been given to this process in the history of psychology. The following are some of the more familiar of them: associative memory (Loeb), law of combination (Woodworth), associative shifting (Thorndike), substitution (Burke, Müller), conditioned reaction (Pawlow, Bechterew), ecphory (Semon), redintegration (Hamilton, Bradley).

11. *The Law of Involution and Regression.* According to this law a developing system may, in the face of obstruction or injury, revert to lower and more primitive adjustments than those which its advanced developmental

status commonly presents as normal. Such regression may be a systematic degeneration, in which functions disappear in the reverse of their order of acquisition. Or the regression may move from higher levels to those lower in complexity.

Thus in drowsiness and fatigue the adult lapses from his usual verbal modes of thought and employs again the pictorial and imaginal representations which children vividly indulge. In mental disorder the patient may face life's dilemmas by adjustments which seem childish and naïve, and in which the fruits of learning and reflection are not capitalized. In senile decay the picture of progressive amnesia is seen to illustrate the involutional order of loss of function. Under various drug influences the first features affected are those elaborations and controls acquired through individual training. Only later does the the disturbance show in the more native and primitive reflexes and adjustments. But such observations scarcely justify the highly dramatic and figurative use of the terms "regression" and "infantilism" as these are played upon in various loosely written contemporary accounts of human nature. (Freud, Ferenzci, Rivers, Brill, Jung.)

12. *The Law of Fixation.* Either through inadequate initial impulse or through a process of arrest or through failure of exercise, a developing system, or part of it, may remain permanently on a low developmental level, which is normally passed beyond. If by "normally" we mean "most frequently" in the species, there are clear examples of fixation in mental development. The picture of mental deficiency is one of final attainment of a lower than average status, most often on a constitutional basis, but occasionally also through accident or calamity.

"Chronic juvenilism" is displayed also by those individuals whose early attitudes of emotion and of self-dependence persist unduly into adult life. Cases have been observed in which "baby talk," persisting into late childhood, presented a picture that might be described as "linguistic arrest."

13. *Whole-heartedness and Gradation.* This law applies to cases or features in which the characteristic course of development is from the univocal to the equivocal; from the whole-hearted to the discriminative; from all-or-none reaction to graded response. In individual life we have seen that emotional patterns follow this course, and these are perhaps the clearest exemplifications of the law. It may be that muscular contraction, in its early development, also follows such a course, and this may even underlie the initial whole-heartedness of primitive emotions.

Rivers [6] suggests that suppressed striving, the "complex," "partakes in some degree of the crude all-or-none character. Months or years may pass without its showing any effects at all. And then it may reveal its presence by some profound and far-reaching disturbance of the mental life." On the other hand, "The sentiments are features of the mind which take part in the most finely graduated processes and are connected with discrimination of the most delicate description." The primitive whole-heartedness of the typical human "instincts" is vividly portrayed by Rivers in the following words:

An animal or child exposed to danger, which is so recognized as danger that it produces a reaction, tends to give

[6] Rivers, *Instinct and the Unconscious*, p. 44.

itself to the reaction fully. If it runs away, it tends to run with every particle of the energy which it is capable of putting forth; if it cries, screams, or utters other sound, it tends to do so with all the vigor at its command. In these cases there is no discrimination of the degree of danger. The reaction by flight or cry is the same whether the danger be great or small. In the case of the animal the movement of a shadow thrown by a falling leaf may produce as strong a reaction as the full sight of its deadliest enemy. . . . If the danger is sufficiently great, or if certain lines of behavior by which the danger would normally be met are frustrated, even the adult man will fail to discriminate the nature of the danger and to graduate his movements accordingly. He will devote every particle of his energy to flight or other form of primitive instinctive behavior. Thus if he becomes angry and assumes an aggressive attitude, his anger and aggression will go far beyond those called for by the needs of the situation. . . . I assume that when the child and animal are so behaving, they are acting in a manner in which they would act if their instinctive behavior had not been modified by experience.

Under the influence of experience, and in the course of development, these whole-hearted modes of conduct become finely graded and discriminative. The law might then be stated as follows: In the course of development processes initially characterized by all-or-none activity become graded to the intensity of the stimulus and discriminative of the more elementary components of situations.

14. *The Law of Inhibition.* Development often involves the suppression, subordination, and inhibition of lower levels and functions by higher ones. Developmental failure or collapse may result from the removal or weakening of this inhibition. Thus useful manual habits quickly inhibit the grasping reflex. Reflective considera-

tion restrains impulsive outbursts and emotional extravagance. The cerebral cortex inhibits the automatic activities of lower motor neurones. Socially impressed standards may retard or suppress the operation of native or ego-centric tendencies.

Inadequate cortical development, or brain injury, or toxic influence, or conditions of exhaustion, may disrupt this organized and integrated hierarchy. Then there may ensue, according to the circumstances, disorganized activity, incoördinate movements, decerebrate rigidity and convulsions, uncontrolled emotional outburst, all-or-none response, exaggerated sensualism, loss of "character," or other forms of developmental collapse. The more precise nature of inhibition is still a topic of active inquiry. The term as now commonly employed is the designation of a result rather than the description of a process.

15. *The Law of Developmental Pace.* Under this general law may be put a number of general aspects of the rate of growth. First there is the simple fact that different processes, functions, or structures develop at differential rates. This fact we have seen abundantly verified in human growth. Next, there is the general fact that development is likely to continue at a pace that is revealed by its earliest manifestations. Thus shorter adults were also short as children; the feeble-minded are slower in early stages of growth than are those destined to reach higher levels. Finally, there is the common tendency for development to slow down as age proceeds.

This last tendency has been summarized by Minot [7] for physical growth in the following words: "The time required to accomplish a change of a given extent increases

[7] Minot, *Age, Growth and Death.*

with the age of the organism." "The older we are the longer it takes us to grow a definite proportionate amount." Sanford [8] affirms that "the same law is true also of mental growth; and, allowing for certain important though temporary checks or even reversals in the tendency of the rate of change to fall off, it gives a true picture of the increasing fixity that is characteristic of advancing life." And Gesell [9] remarks that "there is an analogous concentration of mental growth in infancy. The older the child gets, the longer it takes it to develop a proportionate amount."

The various graphs showing the rate of growth in different processes or skills, which we have presented at different points throughout this volume, serve the purpose of exhibiting these various facts of developmental pace. In terms of such units as are used in the various cases, the rates vary with the feature measured, and the general slowing up as maturity is approached is a common characteristic of the curves.

16, 17. *The Laws of Diversity and Organic Quality.* Both of these have been so frequently emphasized in the foregoing pages that a restatement seems all that is called for at this point.

The Law of Diversity states that those human traits are more variable, and probably also more susceptible to extrinsic influence, and certainly more strikingly involved in cases of defect or talent, which are more functional, more recent (whether in phylogeny or in ontogeny), more complex, more dispensable, and more symbolic.

[8] Sanford, "Mental Growth and Decay," *American Journal of Psychology,* XIII, 1902, pp. 426-449.

[9] Gesell, *The Mental Growth of the Pre-School Child,* pp. 18, 19, 1925.

The Law of Organic Quality states that, in personal make-up, correlation rather than compensation is the rule. Through selection or otherwise desirable traits are positively correlated, so that the status of one reflects also the status of others. A "quality of the organism" tends to pervade the whole system. "To him that hath shall be given."

18. *The Law of Compensation.* A law of compensation is sometimes suggested for human development. There can be no doubt that as life proceeds individuals come to develop artifice where native talent is wanting, and to substitute more attainable but less desirable satisfactions for those they prefer but cannot achieve. But such compensations are matters of experiment and learning, and adequate evidence is lacking to show that compensation is an intrinsic developmental law. The blind come to rely on their hearing, and the dumb resort to gestural communication. But such resort to the next best instrument is not compensation; it represents only a makeshift through the ordinary modes of learning. The ears of the blind are no better than the ears of those blessed with vision. The intellectually inferior are not by compensation endowed with better grades of "mechanical intelligence." They may to be sure be restricted to preoccupation with mechanical affairs, in which their dexterities would be all the better had they better intelligence.

19. *The Laws of Habit and Inertia.* Under the special influences of repetition and effect the system becomes set according to modes which it has already exercised.[10] These modes not only tend to persist (inertia) but also to

[10] James, *Principles of Psychology*, Vol. I, chap. iv.

interfere with the adoption of new ones. We have had occasion to see how habits of deference, of dependence, of limping, and the like, once established, may slant the individual toward faulty adaptation in new situations and may even constitute neurotic involvement. And we have seen the principle illustrated in those cases in which emotional attitudes, acquired in one situation, are preserved and "transferred" to other situations remotely but perhaps irrelevantly resembling these.

That perfected structures often lag behind the need they originally served, we have also seen. Thus habits are slowly acquired to satisfy needs that are immediate; they may then persist when the needs have disappeared. A clear illustration we have found in the case of the parents of adolescents. Habits of parental care, of authority and responsibility, persisting through "inertia," may prevent that independence of action and that freedom of choice which youth craves when it no longer needs close parental supervision. The habits of the aged, outlasting their serviceableness, conflict with newer customs and produce tension between young and old, or between the aged and their environment. In the case of physical organs we have seen how full the body is of vestigial structures which no longer serve a useful function. Many linguistic usages and social ceremonies fall into the same category, the category of the vestigial.[11]

20. *The Law of Reduction.* In the course of development, and in ordinary learning, processes and operations initially slow and rich in detail become telescoped, compressed, and expedited by the substitution of tentative for overt acts, and by the shift from conscious to unconscious

[11] Ogburn, *Social Change*, Part IV, 1922.

adjustment.[12] Thus the vivid imagery of childhood degenerates into the fleeting and patchy sketches or traces of adult pictorial memory. In perfected reading, and in the understanding of spoken speech, slight cues only are needed to touch off meanings which formerly required elaborate representation. Thoughts and references once carried only in mimetic portrayal or in audible speech may run their course in terms of tentative gestures and incipient or suppressed articulation (inner speech). This law is closely related to that of redintegrative substitution, since its operation is often made possible only by the substitution of slight cues for historically elaborate contexts.

In space perception the mere visual appearance of an object (as its color, apparent size, elevation in the field of vision, double images) suffices to convey information once attainable only by an actual journey and exploration. Manual and other skilled acts such as typewriting, penmanship, the handling of machinery, come to be controlled by slight cues, and their performance lapses to the level of automatism, except when special difficulties arise.

21. *Law of "Stimulation Range."* [13] Development not only involves better adaptation to immediately present stimuli; it also brings into being "distance receptors" which tend constantly to increase the radius of the territory to which the organism responds. It thus locates effective stimuli at more remote points in space or time. In normal development the "effective environment" is thus a constantly expanding one. The sensory equipment of primitive forms of animal life is adapted only to stim-

[12] Titchener, *A Beginner's Psychology*, pp. 181, 242*ff*.

[13] Giddings, "Stimulation Ranges and Reaction Areas," *Psychological Review*, November, 1924, pp. 449-455.

uli that actually come in contact with the body, to mechanical and chemical stimuli. Later development shows forms responding to various forms of radiant energy, the sources of which may be at great distances from the organism. Thus sight and hearing are the two great distance receptors in the case of the higher animal forms. And the devices of symbolism, underlying such functions as imagination, memory, and thought, enable the individual to adapt to events in the remote past or to future contingencies.

22. *The Law of Selection.* Development often proceeds by the elimination of the unfit organism, the futile adjustment, the faulty technique, the inadequate organ, the poorly adapted custom or institution. This leads to the survival and perpetuation of the more effective feature. In biological evolution, selection is a commonplace term. In societal growth the process is also conspicuous; we have seen that not only is there a competition and selection among institutions, but that institutions, once established, also select for survival or for prosperity those individuals to whom they are congenial.

In individual development selection also plays a major rôle. It is a special feature of all ordinary learning, in which, from an original repertoire of native or previously acquired acts, those are perpetuated and consolidated which at least with reasonable adequacy solve the problem or bring the desired satisfaction.

23. *The Law of Joint Influence.* Perhaps the most fundamental and incontrovertible of all these laws is that development is dependent upon the joint influence of intrinsic and extrinsic factors. Personality is determined both by "native capacity" and by experience, opportunity,

and practice. Neither heredity nor environment alone could accomplish growth, for growth is a complex process in which "nature and nurture" both operate. For every response a stimulus is prerequisite; but the nature of the response varies both with the character of the stimulus and with the previous organization of the reacting mechanism.

Development is not the mere unfolding of an inner organization, nor the mere sorting of materials already present, but consists in the formation of new materials and qualities, structures and functions, through combination, reaction, and interaction of germinal elements, under the influence of both intrinsic and extrinsic forces or stimuli.[14]

This law of joint influence, in the case of mental development, has been succinctly summarized by Sanford in the following words: "There are certain growth tendencies somehow latent in the nervous system, and there are certain experiences which the baby's human body and his situation in the midst of a human family are sure to bring him; and these growth tendencies and human experiences, between them, see to it that his mind shall grow up into something that we shall recognize as a human mind." [15]

Many interesting problems arise out of this joint influence of intrinsic and extrinsic factors, some of them problems which are particularly difficult of solution. Which particular extrinsic factors are involved in a given developmental process? Thus, if laziness be not due to constitutional make-up alone, just what are the features

[14] Conklin, *Heredity and Environment*, p. 88.
[15] Sanford, *op. cit.*, p. 430.

of experience that contribute to its development? And just what quantitative relations exist between the extrinsic factors and the trait?

A fundamental problem is concerned with the interaction of the two types of influence. Is "growth" (with its predominant intrinsic basis) influenced by "exercise" (chiefly an extrinsic factor)? Thus, is a growing organ[16] or capacity stimulated to more rapid growth by activity and exercise; or does the gain through practice consist chiefly in improvement in method and adoption of effective devices and methods of work? This problem, so far at least as mental development is concerned, is still unsettled. The evidence of recent investigations reported by Gates is that, at least in the functions and under the circumstances of the experiments, continued exercise before the time of maturity does not stimulate more rapid growth. "Except for the improvement in methods, devices, 'tricks of the trade,' and for the adjustments to the test situations, which are rather quickly acquired and renewed, no permanent effects of practice due to improved capacity or stimulated growth or other causes, can be detected."

Other tentative general developmental principles may occur to the reader, and it is a profitable exercise for the student to attempt to formulate such laws, or to test, by application to the concrete facts, the validity of formulations suggested by others. Perhaps such instances as we have given represent the clearest cases of possible generalization. Such an attempt to formulate general develop-

[16] Gates, *et al.*, *Journal of Educational Psychology*, December, 1925, pp. 583-592; April, 1926, pp. 226-236. The functions studied were memory for digits and speed of tapping; the subjects were children of kindergarten age.

mental laws gives a very inadequate picture of the wealth of detail exhibited in human growth and decline. As our knowledge of mental development increases, some of these laws may be better established; some may be quite rejected; others may be combined into different forms of statement. Certainly entirely new generalizations will also be made, and developmental processes now apparently unrelated may be seen to involve mutual and underlying principles.

Even at best, the laws of biological, psychological, and social phenomena remain less precise and definitive than those describing the mechanical data of physics, chemistry, and mathematics. That even a meager score of tentative developmental laws may be suggested gives an intimation of the intriguing complexity of those processes which constitute the growth and decline of the human mind.

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